Original Research Article

Role of Colour Doppler Ultrasonography in evaluation of scrotal pain and swelling

Rajesh Kumar

Assistant Professor, Department of Radiodiagnosis, Government Medical College, Rajnandgaon Chattisghar, INDIA.
Email: kumarpateldrrajesh@gmail.com

Abstract

Background: Color Doppler ultrasonography is an important tool for diagnosis of scrotal diseases because of its ability to depict anatomy and perfusion in real time. It plays a major role in distinguishing intratesticular from extratesticular abnormalities. **Aim:** To evaluate the role of colourdoppler ultrasonography in evaluation of scrotal pain and swelling. **Material and Methods:** This study was carried out in 100 patients with complains of scrotal pain and swelling. All patients were studied using high frequency real time Gray scale ultrasonography and Doppler Aloka Prosound–Siemens Sono lineand sagittal and transverse images were obtained. **Results:** Colour Doppler Ultrasonography accurately diagnose all cases of epididymitis or epididymoorchitis, testicular torsion, varicocele, and hydrocele, pyocele, funiculites, hematocele, Fouriner's Gangrene, cellulitis of Scrotal wall inflammation, AVM of scrotum and Epididymal cyst with sensitivity 100% and specificity 100%. Five cases were diagnosed as testicular malignancy on CDUS out of which, only 4 cases were subsequently found to have malignancy. **Conclusion:** When color Doppler sonography is supplemented with High frequency gray scale US, the sensitivity of diagnosing acute scrotal pathology will be increased. In addition, it accurately differentiates between testicular ischemia and torsion from acute inflammatory diseases in acute painful scrotal conditions.

Keywords: colour Doppler, ultrasonography.

***Address for Correspondence:**
Dr. Rajesh Kumar, Assistant Professor, Department of Radiodiagnosis, Government Medical College, Rajnandgaon Chattisghar, INDIA.
Email: kumarpateldrrajesh@gmail.com
Received Date: 12/04/2018 Revised Date: 21/05/2018 Accepted Date: 10/06/2018
DOI: https://doi.org/10.26611/1013636

Access this article online

Quick Response Code:

Website: www.medpulse.in

Accessed Date: 14 June 2018

INTRODUCTION

Certain testicular swellings are most difficult to diagnose with confidence based on physical examination alone. It is often difficult to decide whether a palpable scrotal mass is arising from the testes itself or from the extra testicular elements. In addition, the normal examination may over look significant pathology and physical signs elicited may be improperly interpreted. The causes of scrotal swelling can be classified as acute and non-acute. Acute causes include torsion, trauma, abscess, and orchitis. Nonacute causes include hydrocele, scrotal hernia, lymphocele, and others.[1,2] Color Doppler ultrasonography is an important tool for diagnosis of scrotal diseases because of its ability to depict anatomy and perfusion in real time.[3]It plays a major role in distinguishing intratesticular from extratesticular abnormalities. The present study was carried out to evaluate the role of colourdoppler ultrasonography in evaluation of scrotal pain and swelling.

MATERIAL AND METHODS

This study was carried out in 100 patients with complains of scrotal pain and swelling. The cases were referred to our Radiological department for scrotal ultrasonography and Doppler study by Department of Surgery of Pt. J.N.M. Medical College Raipur and Dr. B.R. Ambedkar Memorial hospital Raipur (C.G.), India. After detailed clinical examination all patients with scrotal pain and swelling were studied using high frequency real time Gray scale ultrasonography and Doppler AlokaProsound (M.No. SSD-4000) –Siemens Sono line (M. No. G-50) and sagittal and transverse images were obtained.

How to cite this article: Rajesh Kumar. Role of colour doppler ultrasonography in evaluation of scrotal pain and swelling. *MedPulse – International Journal of Radiology.* June 2018; 6(3): 74-78. http://www.medpulse.in/Radio%20Diagnosis/

Additional views were also obtained in coronal and oblique planes, with the patient being upright and performing Valsava maneuver. Diagnostic accuracy of CDUS was determined by comparing it with the final diagnosis, which was based on clinical outcome (i.e., positive response to medical treatment), operative findings, fine needle aspiration cytology (FNAC), and histopathological examination results.

RESULTS

The present study has been carried out in 100 patients with clinically suggestive scrotal lesion. Commonest clinical presentation was a scrotal swelling, as in 39 cases (39%), followed by pain, swelling and fever in 23 cases (23%).39cases presented with only swelling (39%). Out of this, unilateral scrotal swelling noted in 23 cases (23%), bilateral in 16 cases (16%). Out of 23 unilateral side of scrotal swelling, 9 cases noted on left side (30%), 14 cases on right side (60 %). Out of 39 cases, 23 cases (23%) presented with acute onset, (duration 2 days to 15 days). 16 cases presented with insidious onset (16%) (duration 15 days to 10 years). Fourteencases presented exclusively with only pain in scrotum (14%). Out of this, 5 cases presented with acute onset (5%) (duration few hours to 5 days), 9 cases presented with chronic pain (9 %) (duration 15 days to months). Out of 14 cases of scrotal pain, 4 cases were on unilateral side (4%), 10 were on bilateral (10 %). Out of 4 cases of unilateral scrotal pain, 2 cases were on left side (2%), 2 cases were on right side (2%). The severity of scrotal pain was of varying degree, ranging from dull aching to very severe pain. Most of the acute onset scrotal pain, particularly those associated with fever had severe pain, whereas, insidious onset, not associated with fever had dull aching scrotal pain. Out of 23 cases of acute onset scrotal swellings, 8 cases (34.7%) had history of trauma, 10 cases (43.4%) had history of burning micturition, 3 cases (13%) had history of pain abdomen. Other associated symptoms include scrotal hematoma and discharging wound on scrotal skin 2 (8.6%) cases.

Table 1: Clinical Diagnosis, CDUS Diagnosis, Intervention, Final outcome

Sr. No	Lesion	Clinical Diagnosis	CDUS Diagnosis	Intervention	Final outcome
1	Epididymitis/Epididymo-orchitis	14	16	Conservative	9 Epididymitis 7 Epididymo-orchitis
2	Epididymal cyst	12	9	Surgery	9 Epididymal cyst
3	Testicular torsion	1	1	Surgery	1 Testicular torsion
4	Scrotal mass	8	4	Histo. Surgery	3 Testicular mass 2 Extratesticular mass
5	Varicocele	2	2	Surgery	2 Varicocele
6	Hydrocele	50	39	Surgery	39 Hydrocele
7	Pyocele/Hematocele	16	12	Surgery	10 Pyocele 4 Hematocele
8	Funiculitis	2	1	Surgery	1 Funiculitis
9	Fournier"s gangrene	2	2	Surgery	2 Fournier's gangrene
10	AVM of scrotum	1	1	DSA	1 AVM of scrotum
11	Orchitis	8	4	Histo. Surg, Cons.	3 Orchitis
12	Cellulitis of Scrotal wall	2	2	Surgery	Cellulitis of Scrotal wall

Out of 100 cases, the pathological processes were detected in 95 cases and 5 cases have found to be normal. The final diagnoses were epididymitis or epididymo-orchitis in 16 cases, hydrocele in 39 cases, varicocele in 2 cases, Scrotal mass in 5 cases, Orchitis in 3 cases, testicular torsion in 1 case, hematocele in 4 cases, pyocele in 10 cases, Funiculites in 1 case, Fouriner's Gangrene in 2 cases, Cellulities of scrotal wall in 2 cases, AVM of scrotum in 1 case and Epididymal cyst in 9 cases.

Table 2: Sensitivity and specificity of CDUS in diagnosis of scrotal lesion and other than scrotal mass

CDUS Diagnosis	Disease present	Disease absent	Total
Disease present	90	0	90
Disease absent	0	0	0
	90	0	90

Sensitivity=100%; Specificity=100%

Colour Doppler Ultrasonography accurately diagnose all cases of epididymitis or epididymo-orchitis, testicular torsion, varicocele, and hydrocele, pyocele, funiculites, hematocele, Fouriner's Gangrene, cellulitis of Scrotal wall inflammation, AVM of scrotum and Epididymal cyst with sensitivity 100% and specificity 100%. 5 cases were diagnosed as testicular malignancy on Colour Doppler Ultrasonography out of which, only 4 cases were subsequently found to have

malignancy. 4 case were turned out to be orchitis, one of which was wrongly diagnosed as malignancy. Out of 5 cases of malignancy, three cases were diagnosed as testicular mass and 2 cases were diagnosed as spermatic cord neoplasm with sensitivity 80% and specificity 75%.

Table 3: Sensitivity and specificity of CDUS in diagnosis of testicular masses

CDUS Diagnosis	Histopathological Diagnosis		Total
	Positive	Negative	
Tumor	4	1	5
Non tumor	1	3	4
	5	**4**	**9**

Sensitivity=80%; Specificity=75%

Overall sensitivity and specificity of Colour Doppler Ultrasonography in diagnosis of scrotal diseases was 98.9% and 80% respectively.

Table 4: Overall sensitivity and specificity of CDUS in diagnosis of scrotal diseases

CDUS Diagnosis	Final outcome		Total
	Disease present	Disease absent	
Disease present	94	1	95
Disease absent	1	4	5
	95	**5**	**100**

Sensitivity=98.9%; Specificity=80%

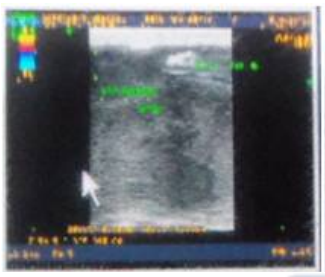

Figure 1: Carcinoma of testis

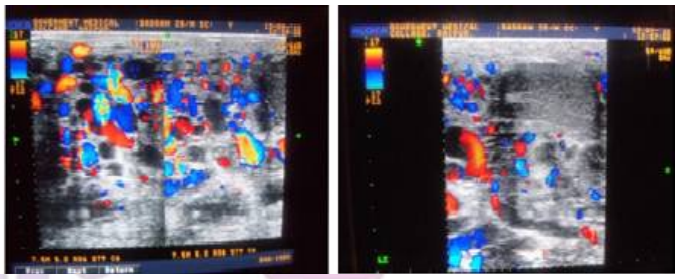

Figure 2: AVM of scrotal wall

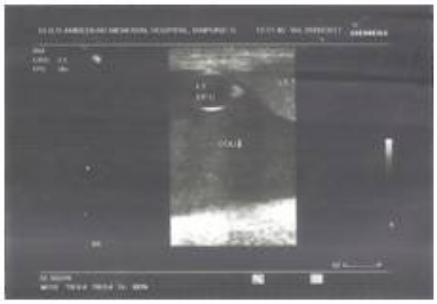

Figure 3: Left Epididymal Cyst

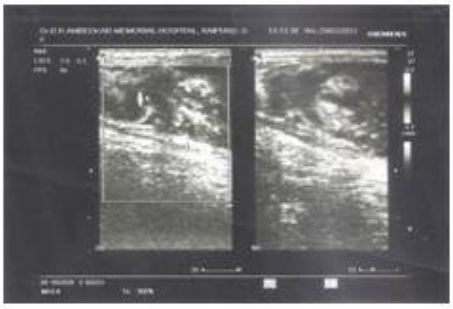

Figure 4: Hetrogenous area in epididymis and Testis

DISCUSSION

The development of colour ultrasonography and high frequency, real time scanners has enhanced the diagnostic accuracy of scrotal sonographic examinations. Common scrotal problem in adolescent and adult male patients that require medical care are scrotal pain and painless scrotal mass or swelling. Out of 100 cases of study, the pathological processes were detected in 95 cases and 5 cases have normal study. Out of 95 cases, 34 cases had pathology bilaterally, unilaterally in 61 cases. Out of 61 cases of unilateral side involvement, 25 cases of involvement were on right side, 36 cases involvement was on left side. Totally, pathology was noted in 129 hemiscrotum out of 100 patients studied. Inflammatory diseases noted in 24 number of cases, 10 cases of Pyocele, 4 cases of Hematocele,1 case of Testicular torsion was also seen. Non Inflammatory swelling was seen in 56 cases. Arger *et al*,[4] in a series of 62 patients, detected inflammatory diseases in 16 cases (26%) and non-inflammatory swellings in 45 cases (doppler 67%). Willscher *et al*,[5] in a study of 43 patients (86 testis), noted inflammatory diseases in 12 cases and non-inflammatory

diseases in 28 cases. In our study, inflammatory conditions constitute the largest number of detected pathology followed by Non-inflammatory swellings. In our study, out of 100 cases, 24 cases were detected have inflammatory scrotal pathology on high frequency US and Doppler study. Chronic epididymitis was the commonest inflammatory pathology detected in 5 cases (20.83%). Next most frequent inflammatory pathology detected was chronic epididymo-orchitis noted in 4 cases (16.66%). Other detected inflammatory pathology included Acute orchitis 3 cases (12.5%), acute epididymo-orchitis 3cases (12.5%), acute epididymitis 4 cases (16.66%), Fournier's gangrene 2 (8.33%), Cellulitis of scrotal wall 2 cases (8.33%) and funiculitis 1 case (4.16%). Horstman, Middleton, and Melson *et al*[72], in their study of 45 patients, found acute epididymitis present in 25 cases (56%), acute epididymo-orchitis in 19 cases (42%), acute orchitis in one case (2%). No case of chronic epididymo-orchitis was reported.Lerner *et al*,[6] in their limited series of 5 cases of acute inflammatory diseases of scrotum, found acute epididymitis in 3 patients (60%), acute epididymo-orchitis in 2 patients (40%). Farriol *et al*,[7] in their study of 25 cases of acute inflammatory diseases of scrotum using high-resolution grey scale and power Doppler sonographic study, found epididymitis in 11 cases (44%), epididymo-orchitis in 10 cases (40%), orchitis in 2 cases (8%), funiculitis in 2 cases (8%). Compared to other studies, in the present study there is low incidence of acute inflammatory conditions and higher incidence of complications of acute scrotal inflammatory disease. This is due to the fact that there is a larger gap of time between onset of symptoms and time of examination (average 4 to 5 days).In addition, there is increased incidence of chronic epididymo-orchitis in this study, mainly due to large incidence of tubercular epididymo-orchitis, the incidence of which is less in western population. In our study four cases of acute orchitis, one case was wrongly diagnosed as acute orchitis, we observed all 3 cases, one unilateral involvement, with one case on bilateral and 2 cases on left side, one case on right side. 3 cases showed diffuse involvement. On high frequency US sonography, three cases of diffuse involvement showed diffuse enlargement with diffuse hypoechogenicity. On color Doppler sonography, all three cases showed increased vascularity in the areas of hypoechogenicity. These findings are similar to the findings of Horstman *et al*,[8]in their study of 45 cases (51 hemiscrotum), Farriol *et al*,[7] in their study of 11 cases. In our study of 24 cases of scrotal inflammatory pathologies, we observed 5 cases of complications of acute scrotal pathology, out of which 2 cases are scrotal wall inflammation. 2 cases of Fournier's gangrene and one case of funiculitis. In cellulitis of scrotal wall in, High-frequency Ultrasonography showed loss of normal uniform hypoechoic appearance of scrotal wall, thickening of scrotal wall, presence of normal testis, epididymis and tunical sac. These findings are similar to those of Luker GD and Siegel MJ.[9] Of 24 cases of inflammatory scrotal pathology, we noted chronic Epididymo-orchitis in 4 cases (16%). Of these, 1 case was bilateral involvement, 3 cases were unilateral involvement. On color Doppler sonography, there was evidence of diffuse increase in vascularity in 4 cases, and response to treatment in 3 cases, one of these cases were having immunocompromised status with HIV positive. Among non-neoplastic scrotal swellings, hydrocele is the commonest pathology noted 39 cases (39%). Out of 39 cases, 36 cases were primary vaginal hydrocele (36%), 3 cases were encysted hydrocele of cord (3%). Out of 39 cases, hydrocele was noted unilaterally in 14 cases, bilateral in 25 cases. These findings are in similarity to previous studies of Arger *et al*[4] and Willscher *et al*.[5] All cases of hydroceles appeared as collection of clear fluid between two layers of tunica. In encysted hydrocele of cord, the collection of clear fluid along spermatic cord appeared as anechoic lesions adjacent to spermatic cord that moves with gentle traction to cord. In present study, we noted two cases of Inguinoscrotal hernia in association with hydrocele. Next most common lesion was varicocele, noted in 2 cases, Out of 51cases (3%). Out of 2 cases, unilateral varicocele noted in 1 cases (50%), Bilateral varicocele noted in 1 cases (50%). A varicocele was considered to be present by high-frequency grey scale US, if 2 or more veins could be identified, with at least 1 vein having diameter of 3 mm or greater. A varicocele was considered to be present by color Doppler US, if retrograde flow was identified within the pampiniform plexus spontaneously and/or during Valsalva maneuver. Varicocele was detected in patients presenting with symptoms like scrotal swelling, pain and infertility. Among 2 patients, who presented clinically with infertility, varicocele was noted in one case. Out of 2 cases of ultrasonographically confirmed cases of varicocele, one cases showed pathological abnormalities in semen analysis in form of Azoospermia. These result indicate that colourdopper is having high sensitivity 100%.These finding were compared to previous similar study by Meacham RB.[10]These finding show similarity to previous study. In our study of 56 cases of non-inflammatory scrotal swellings, we noted 9 cases of epididymal cysts. Out of 9 cases of epididymal cysts,6 were unilateral, 3 were bilateral and onecase showed multiple cysts. Most of the epididymal cysts were uniloculated, situated in the head of epididymis.

CONCLUSION

When color Doppler sonography is supplemented with High frequency gray scale US, the sensitivity of diagnosing acute scrotal pathology will be increased. In addition, Color Doppler sonography accurately differentiates between testicular ischemia and torsion from acute inflammatory diseases in acute painful scrotal conditions.

REFERENCES

1. Bailey and Love's Short Practice of Surgery; 26th edition. Edited by N. S.Williams, C. J. K.Bulstrode and P. R.O'Connell. Boca Raton, FL: CRC Press, 2013.
2. Cass AS, Luxanberg M. Testicular Injuries. Urology 1991; 37:528-530.
3. Lerner RM, Mevorach RA, Hulbert WC, Rabinowitz R. Color Doppler US in the evaluation of acute scrotal disease. Radiology 1990; 176:355-8.
4. Arger PH, et al. Prospective analysis of the value of Scrotal Ultrasound. Radiology 1981; 141:763-766.
5. Willscher MK, et al. Scrotal ultrasonography. The Journal of Urology 1983; 130:931–935.
6. Lerner RM, et al.Color Doppler US in the evaluation of Acute Scrotal Disease.Radiology 1990; 176:335-358.
7. Farriol VG, et al. Gray-scale and power Doppler sonographic appearances of acute inflammatory diseases of the scrotum. J of Clin Ultrasound 2000; 28:67- 72.
8. Horstman WG, Middleton WD, Melson GL. Scrotal inflammatory disease: Color Doppler US findings. Radiology 1991; 179:55-59.
9. Luker GD, Siegel MJ.Color Doppler sonography of the scrotum in children. American Journal of Roentgenology. 1994; 163: 649-655.
10. Meacham RB, et al. The incidence of Varicoceles in the general population when Evaluated by physical Examination gray scale sonography and colorDoppler sonography. The Journal of Urology 1994; 151:1535-1538.

Source of Support: None Declared
Conflict of Interest: None Declared