

Evaluation of scrotal pathologies by ultrasound and color doppler

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Abstract

Background: Ultrasound is the modality of choice for evaluation of scrotal lesion. This a prospective observational study to evaluate the role of ultrasound and Doppler in various scrotal pathologies. **Material And Method:** in this study 50 patients were scanned with linear probe (3 MHz- 12 MHz) on the Philips HD 11 ultrasound machine. Detailed clinical history was taken with detailed clinical examination finding were recorded over a period of 2 years at Bharati vidyapeeth medical college and hospital. **Result:** Out of 50 patients, 18 (36 %) patients were between age group of 21 to 40years of age. Most common symptom was scrotal swelling (17 pt-34%). Most common pathology was hydrocele seen in 12 patients (24 %) followed by scrotal inflammatory disease, 10 (20%), malignant testicular tumour, 2(4%) and varicocele 6 (12 %). **Conclusion:** Ultrasonography and colour Doppler is non-invasive first modality of choice for evaluation of various scrotal pathologies. It is useful for differentiating testicular swelling from and extra testicular swelling and solid from cystic testicular mases. Ultrasonography is also use full in acute scrotal condition for differentiating acute inflammatory disease from testicular ischemia and torsion. Ultrasonography also has high sensitivity to differentiate solid from cystic scrotal masses. Role of CT is limited only in evaluation of spread of testicular tumour.

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INTRODUCTION

Both testes are located superficially within a cutaneous bag scrotum. Though it is easily accessible for clinical examination, it is difficult to differentiate benign and malignant swellings and intra-testicular from extra-testicular swellings, and hydrocele adds more difficult to know the condition of underlying testis. Clinical signs and symptoms are usually nonspecific, variable and misleading. Hence imaging is very use full and problem solving. Until mid-1970 clinical evaluation of scrotal contents was confined to palpation and trans-illumination. Since Murray Miskin and Jerald Bain¹ first published

report about using diagnostic ultrasound as a modality of investigating scrotal pathologies in 1974, advances in instrumentation and transducer design have progressed to the point where high frequency US is the modality of choice in investigating scrotal and testicular pathology. For imaging of other body parts CT and MRI are the most important imaging modality but in scrotal diseases both have certain limitations. High-resolution sonography provides excellent anatomic detail of the scrotal wall, testis and epididymis; when colour Doppler and power Doppler imaging are added, testicular perfusion can be assessed.² Sonography is non-ionising, non-invasive, rapid, simple, inexpensive and easily available imaging modality. High resolution and colour Doppler Sonography now widely accepted as the method of choice for screening and diagnosis of both acute and non-acute scrotal diseases.

MATERIALS AND METHODS

A total of 50 patients with known or suspected scrotal pathologies underwent scrotal ultrasonography after taking a written, informed consent at Department of Radio-diagnosis and Imaging, Bharati Vidyapeeth

Deemed University Medical College, Pune over a period of 2 yrs. This study was conducted on patients of any age group of male sex, referred to the for USG of scrotum. This was a descriptive, cross sectional study. Patients with inguinal hernia or lymphadenopathy were excluded from the study. Scrotal Ultrasound was performed on Philips HD 11 machine using linear 3 to 12 MHz transducer. In marked scrotal swelling, a lower-frequency

transducer is helpful with. Scrotal sac can be supported or elevated with the help of examiner's hand or towel. Images are obtained in longitudinal and transverse planes along with simultaneous evaluation of images of both testes for comparison. Colour Doppler is used to evaluate for abnormalities of flow and to differentiate vascular from nonvascular lesions.

OBSERVATIONS AND RESULTS

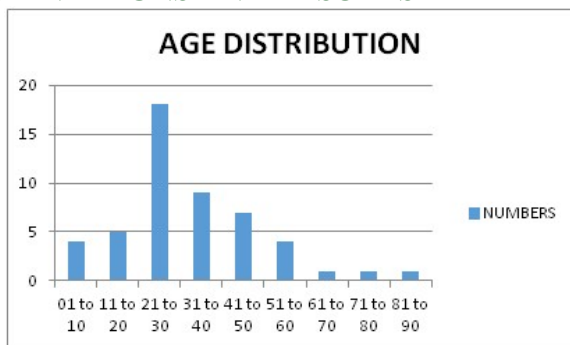


Figure 1: Showing age wise distribution

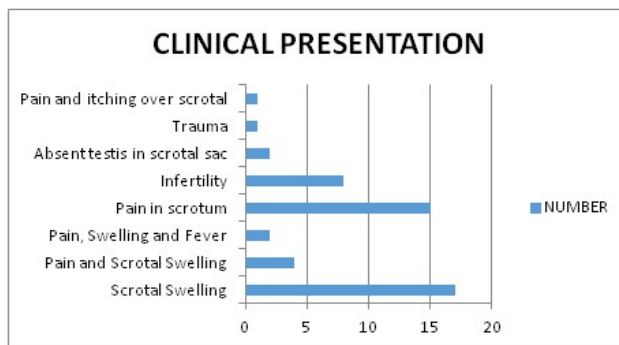


Figure 2: Showing clinical spectrum of presentation

Table 1: Showing Spectrum of Scrotal Pathologies

Type of pathology	Numbers
Hydrocele	12
Varicocele	6
Epididymitis	5
Epididymo-orchitis with funiculitis	5
Epididymal cyst	4
Testicular tumours	2
Undescended Testis	2
Testicular torsion	1
Spermatocele	1
Testicular hematoma	1
Malrotated testis	1
Bilateral small testes	1
Congenital Hydrocele	1
Encysted hydrocele of spermatic cord	1
Scrotal wall varices	1
Scrotal filariasis with intratesticular varicocele	1
Bilateral testicular cyst	1
Total	46

Table 2: Spectrum of Hydrocele with sidedness

TYPE OF HYDROCELE	RT	LT	B/L	TOTAL
PRIMARY	2	1	2	5
SECONDARY	4	1	2	7
CONGENITAL	1	0	0	1
FUNICULAR	0	0	0	0
ENCYSTED	1	0	0	1

Table 3: Showing Epididymo-orchitis spectrum with sidedness.

Type	RT	LT	BL	TOTAL
Ac. Epididymo-orchitis with funiculitis	3	1	0	4
Chr. Epididymo-orchitis with funiculitis	0	1	0	1
Ac.Epididymitis	3	1	0	4
Chr.Epididymitis	0	0	1	1
Ac. Epididymo-orchitis without funiculitis	0	0	0	0
Chr. Epididymo-orchitis without funiculitis	0	0	0	0
Funiculitis	0	0	1	1

Table 4: Showing Spectrum of varicocele with sidedness (n=6)

SIDEDNESS	GRADES OF VARICOCELE				TOTAL
	G1	G2	G3	G4	
LT	2	1	1	0	G1+G2+G3+G4 4
RT	1	0	0	0	1
B/L	0	0	1	0	1

Table 5: Showing Undescended testis location and sidedness

LOCATION	RT	LT	B/L
ING CANAL	0	1	1
ABDOMINAL	0	0	0
ABSENT	0	0	0

Table 6: Showing spectrum of Non neoplastic scrotal swellings

Type	No.
Hydrocele	14
Epididymal cyst	4
Spermatocele	1
Simple cyst of testis	1

Table 7: Showing Spectrum of Neoplastic Scrotal Swellings

TYPES	NUMER
Seminoma	1
Leydig cell tumour	1
TOTAL	2

Table 8: Showing Spectrum of gray scale and colour Doppler appearance

ECHOPATTERN	Ac.EO with funiculitis	Chr.EO with funiculitis	Ac.Epididymitis	Chr.Epididymitis
Hyperechoic	0	0	0	0
Hypoechoic	1	0	0	1
Heterogeneous	3	1	4	0
Isoechoic	0	0	0	0
Epididymal calcification	1	0	0	0
Testicular calcification	0	0	0	0
Colour Doppler increased flow	4	1	4	0

DISCUSSION

The clinical presentation is often nonspecific and clinical examination alone is not sufficient for diagnosis and management of scrotal swelling. Because of superficial location of the scrotal contents makes them ideally suited for sonographic examination. The diagnostic accuracy has

significantly increased with the development of high frequency real time with color Doppler scanners for evaluation of scrotal pathologies. In this study, we have examined 50 patients with high frequency ultrasound scan and color Doppler study was done in all cases, for detection of scrotal and testicular pathology. The age distributions of cases in this study are described in Graph-

1, which varied from 1 Years to 90 Years. Highest number of cases presented were in the age group of 21 to 30 (18 cases – 36%), followed by 31 to 40 years (9 cases – 18%). Therefore, age group of 21 to 40 years constitutes 54% of our cases. The cases presented with various clinical presentations with frequency are depicted in graph-2. Commonest clinical presentation was scrotal swelling (17 cases-34%), followed by only scrotal pain (15 cases - 30%) and then infertility in 8 cases (16%).

Types of scrotal and testicular pathology detected:

Out of 50 cases of study, the pathological process was detected in 46 cases and 4 cases showed normal study. The distribution pattern is depicted in Table-1; pathology noted in the patients, which led to diagnose the total pathologies of 46, in 50 patients. Out of 46 cases, 11 cases had pathology bilaterally, unilaterally in 35 cases. Out of 35 cases of unilateral side involvement, 23 cases of involvement were on right side, 12 cases involvement was on left side. Totally, pathology was noted in 46 hemiscrotum out of 50 patients studied. Hydrocele was the most common pathology noted in 12 cases (43%), followed by varicocele noted in 6 cases, epididymitis noted in 5 cases, epididymo-orchitis with funiculitis noted in 5 cases, epididymal cysts in 4 cases, undescended testis in 2 cases, testicular neoplastic lesions noted in 2 cases, testicular torsion in 1 case, spermatocele in 1 case, testicular hematoma in 1 case, malrotated testis in 1 case, bilateral small testis in 1 case, congenital hydrocele in 1 case, encysted hydrocele of spermatic cord in 1 case, scrotal wall varices in 1 case, scrotal filariasis with intra-testicular varicocele and bilateral testicular cyst in 1 case. Donald P Orr *et al* (1980)³ conducted a prospective study in 20 cases. Out of 21 abnormal testes, hydrocele was the commonest diagnosis (34.2%) followed by epididymo-orchitis. Arger *et al*⁴, in a series of 62 patients, detected the following pathologies: Inflammatory diseases in 16 cases (26%), and non-inflammatory swellings in 45 cases (67%). Richie *et al*⁵, in their study of 124 patients (243 testicles) by ultrasonography, found inflammatory lesions in 31 cases, and non-inflammatory swellings in 75 cases. In our study, hydrocele was commonest pathology noted in which secondary hydrocele 7 cases (58%), of which majority related to epididymo-orchitis and varicocele was noted. Therefore, over all inflammatory conditions constitute the largest number of detected pathology, followed by non-inflammatory swellings.

HYDROCELE

The spectrum of hydrocele is shown in table No.2, totally 14 cases of hydroceles found in 46 cases of total scrotal pathologies, out of which secondary hydrocele was commonest (7 cases, 50%), followed by 5 cases of primary hydrocele and one case of congenital hydrocele/

encysted hydrocele of cord. Most of the hydroceles show clear anechoic collections, majority of secondary showed internal echoes and few with septations. Dohrethy FJ (1991)⁶ in their study of 70 patients with hydrocele minute particles noted in 62% of cases. These were cholesterol crystals with no significance.

VARICOCELE

Next most common lesion was varicocele, the spectrum of varicocele distribution depicted in Table No.4. Varicoceles noted in 6 out of 46 cases of scrotal pathology (13%). Out of 6 cases, unilateral varicocele noted in 5 cases (83.33 %) out of which 4 were on left side and 1 on right side. Bilateral varicocele noted in 1 case (16.66%). 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 colour Doppler US, if retrograde flow was found in the pampiniform plexus either spontaneously and/or after asking the patient to perform Valsalva maneuver (Randall *et al*)⁷. Varicocele was detected in patients presenting with symptoms like scrotal swelling, pain, and infertility. Among 8 patients who presented clinically with infertility, varicocele was noted in 6 cases. Different grades of varicocele were seen in 6 cases, overall grade 1 varicocele was most common, (3 cases– 50%). Out of 6 cases of HRCDC confirmed cases of varicocele, 2 cases showed pathological abnormalities in semen analysis in form of Oligospermia or Aesthenospermia. These findings were in similarity with previous studies^{7,8,9}

Epididymo-orchitis

10 cases were detected having epididymo-orchitis. Spectrum of types of epididymo-orchitis depicted in Table-3, graph no 3. Acute epididymo-orchitis with funiculitis and acute epididymitis was the commonest inflammatory pathology detected, noted in 4 cases each (40%), followed by chronic epididymo-orchitis with funiculitis and chronic epididymitis noted in 1 case each (10%), other detected inflammatory pathology include funiculitis 1 case. Horstman, Middleton, and Nelson¹⁰, in their study of 45 patients, found acute epididymitis present in 25 cases (56%), acute epididymo-orchitis in 19 cases (42%), acute orchitis in 1 case (2%)¹⁰. No case of chronic epididymo-orchitis was reported.

High frequency US and colour Doppler appearance of inflammatory scrotal pathology:

In our study of 10 cases of inflammatory scrotal pathology, the High-resolution US and colour Doppler appearance findings are depicted in table No.8; the most common finding is heterogeneous echo-pattern of epididymis in acute epididymitis, (4 cases out of 10), and

heterogeneous echo pattern of testis and epididymis in acute epididymo-orchitis (3 cases out of 10). It is comparable to other studies. Of 4 cases of acute epididymitis, we observed diffuse heteroechoogenicity with diffuse increase in vascularity, and size of epididymis was increased. These findings are similar to the findings of Horstman *et al*¹⁰, in their study of 45 cases (51 hemiscrotum), Farriol *et al*¹¹, in their study of 11 cases.

Of 10 cases of inflammatory scrotal pathology, we noted acute epididymo-orchitis in 4 cases (40%). Of these, 1 case of left side involvement, 3 cases were right side involvement. On High-frequency US, we observed diffuse increase in size of epididymis and testis in all 4 cases. There was heterogeneous echotexture in 3 cases and hypo echogenicity in 1 case. There was evidence of epididymal calcification seen in 1 case. On colour Doppler sonography, there was evidence of diffuse increase in vascularity in all 4 cases. High-frequency US and colour Doppler sonography findings are in similarity with study Kim SH *et al*¹²

Undescended testes:

Undescended testes was next most common. table No 5, depicts the location and sidedness of undescended testis. Two cases were referred with clinical suspicion of incompletely descended testes, one case was unilateral in presentation, 1 case bilateral. Age of presentation was 2 years and 3 years. The size of undescended testes found to be smaller in cases, which presented clinically in later stages. High frequency US could identify 2 cases of incompletely descended testes, which were in the inguinal region. The present study shows that high frequency US is sensitive in detecting clinically palpable cases, and is less reliable diagnostic modality in detecting abdominal ectopic testes. A study by Robert Weiss *et al*¹³, in which they studied 20 cases of palpable undescended testes, could identify 14 cases (70%) by high frequency US and out of 21 cases of non palpable testes only one case was identified by high frequency US. They concluded that high frequency US cannot satisfactorily stand alone as a screening modality, particularly in the young patient. However, high frequency US is sensitive in differentiating clearly between testes and lymph nodes on a textural basis.

Non neoplastic scrotal swellings:

In our study of 46 cases of scrotal pathologies (Table 6, graph 4) , we noted 4 cases of epididymal cysts, 1 case of spermatocele. Out of 4 cases of epididymal cysts, 3 were unilateral, one was bilateral. Most of the epididymal cysts are uniloculated, situated in the head of epididymis, thin walled anechoic. In present study, we detected 1 case of spermatocele, which appeared on high frequency US scan as cystic structure with fluid level or fluid-debris level.

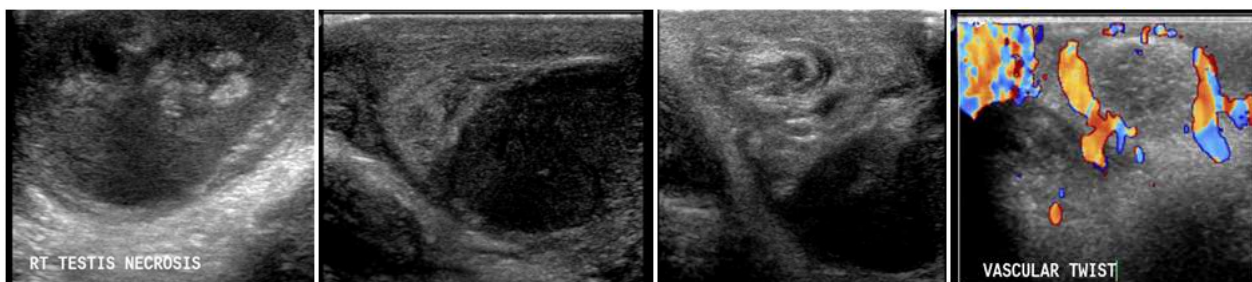
Leung *et al*¹⁴, in their study of 40 subjects, detected 29 cases of epididymal cysts and spermatoceles.

Scrotal neoplasms:

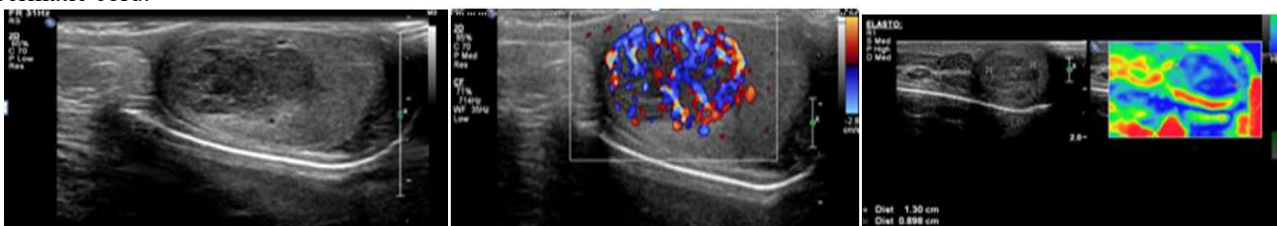
In our study 2 scrotal neoplasms were diagnosed. The intra-testicular tumors include seminoma, 1 case (50%) and one case of leydig cell tumour. The two tumors were accurately diagnosed by ultra sound. Confirmed by histopathological findings. Table no 7. Ultrasound could distinguish seminomatous from non-seminomatous tumors in all cases. Rick feld and Middleton (1992)¹⁵, described the features of seminoma on ultrasound as, homogenous, hypoechoic, oval shaped or round, sharply demarcated, possible multifocal involvement. These features were correlating with our study.

Torsion testis:

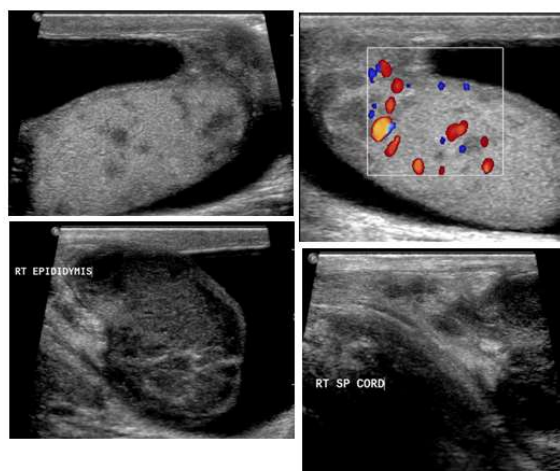
In our study 1 case of testicular torsion noted, presented clinically with acute onset of pain. Grey scale showed change in axis, with oedema. On colour Doppler showed absent colour flow. It showed torsion knot on gray scale at the root of scrotum, where epididymis wound around the cord to form torsion knot complex. The colour Doppler confirmation showed whirl pool sign appearance of spermatic cord in cross section. Clinically suspected torsion was diagnosed as acute epididymo-orchitis in 2 cases, which avoided unnecessary surgical intervention. In a study conducted by Boopathy Vijayaraghavan¹⁶ in 221 patients underwent sonography for acute scrotum. 65 had epididymo-orchitis with a straight spermatic cord while 61 patient had complete torsion with twisting of the cord with whirlpool sign on gray scale imaging and absent colour flow distal to the whirlpool. There was incomplete torsion in 4 patients in whom the whirlpool sign was seen on both gray scale and color Doppler imaging. They concluded the sonographic real-time “whirlpool sign” is the most specific and sensitive sign of torsion, both complete and incomplete.



Case-1 : Testicular torsion: heterogeneous hypoechoic right testis appears with absent vascularity and twisting of right spermatic cord.



Case 2: Leydig Cell Tumor - 11 years old male child with precocious puberty presented with left scrotal swelling. Left testis appears enlarged with well defined hypoechoic lesion.



Case 3: Epididymo-Orchitis with Funiculitis -35 years old male patient presented with pain in right scrotal region. Bulky hypoechoic Right testis, epididymis and spermatic cord with raised vascularity.

CONCLUSION


High resolution sonography and color Doppler is a non-invasive, easily available, relatively cheap, rapid, repeatable and involves no radiation, is an accurate diagnostic imaging modality, suitable for both diagnosis and follow up of various scrotal pathologies. The Colour Doppler sonography accurately differentiates between testicular ischemia and torsion from acute inflammatory diseases in acute painful scrotal conditions. Colour Doppler is most sensitive in detection of varicoceles in comparison with clinical examination. Ultrasound can differentiate testicular from extra-testicular swellings and solid from cystic scrotal masses, and very sensitive in diagnosis of non neoplastic and neoplastic scrotal

swellings. This study also showed that most of extra-testicular scrotal masses were cystic and benign; most of intra-testicular scrotal masses were solid and malignant. Ultrasound helps in differentiating different types of hydrocele and hence proper management. Colour Doppler is sensitive in localization of palpable undescended testis.

REFERENCES

1. Miskin M and Bain J: B-mode ultrasonic examination of the testes. Journal of Clinical Ultrasound, 1974 Dec; 2(4):307-11.
2. Dogra VS, Gottlieb RH, Oka M, Rubens DJ. Sonography of the scrotum. Radiology 2003; 227: 18–36.

3. Donald Orr, Skonlunick ML : Sonographic evaluation of the abnormal scrotum. *Clinical Radiology* 31: 109- 113, 1980.
4. Arger PH, Mulhern CB Jr, Coleman BG, Pollack HM, Wein A, Koss J, Arenson R, Banner M. Prospective analysis of the value of Scrotal Ultrasound. *Radiology*. 1981 Dec; 141(3):763-6.
5. Richie JP, Birnholz J, Garnick MB Ultrasonography as a diagnostic adjunct for the evaluation of masses in the scrotum. *Surg Gynecol Obstet*. 1982 May; 154(5):695-8.
6. Doherty FJ: Ultrasound of non acute scrotum. *Semin in US, CT and MR*. 12: 131- 156, 1991.
7. Meacham RB, Townsend RR, Rademacher D, Drose JA. The incidence of varicoceles in the general population when Evaluated by Physical examination, gray scale sonography and color Doppler Sonography, *J Urol*, 1994; 151: 1535-1538 .
8. McClure RD, Hricak H, Scrotal ultrasound in the infertile man: Detection of Sub-clinical Unilateral and bilateral varicoceles. *J Urol*, 1986; 135:711-715.
9. Nobuyuki Kondoh *et al*, Significance of Sub clinical Varicocele Detected by Scrotal Sonography in Male Infertility: A Preliminary Report. *J Urol*, 1993; 150:1158-1160 .
10. Horstman WG, Middleton WD, Nelson GL. Scrotal inflammatory disease: Color Doppler US findings. *Radiology* 1991; 179: 55-59.
11. Farriol VG, Comella XP, Agromayor EG, Creixams XS, Martinez DL, Torre IB. Gray-scale and power Doppler sonographic appearances of acute inflammatory diseases of the scrotum. *J of Clin Ultrasound* 2000; 28 : 67-72.
12. Kim SH Tubercular epididymitis and Epididymo orchitis. *J Urol* 1993; 50 :81-84 .
13. Weiss RM, Carter AR, Rosenfield AT. High resolution Real-time Ultrasonography in the Localization of the Undescended Testis. *J Urol*. 1986 May; 135(5):936-8.
14. Leung ML, Gooding GA, Williams RD. High-resolution sonography of scrotal contents in asymptomatic Subjects, *AJR*, 1984; 143:161-164.
15. Feld R. Recent advances in sonography of testes and scrotum, *RCNA*, 1992; 30(5); 1033-1051.
16. Vijayaraghavan S B ,Sonographic Differential Diagnosis of Acute Scrotum Real-time Whirlpool Sign, a Key Sign of Torsion. *J Ultrasound Med* 2006; 25:563–574.



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