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Evaluation of scrotal pathologies by high frequency ultrasound with color Doppler study

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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: *30 patients were scanned with linear probe (7.5-11 MHz) on the GE logiq P5 ultrasound machine at GCS Medical College,Hospital and Research Center,Ahmedabad,a Tertiary care center providing hospital in Ahmedabad,Gujarat. Brief clinical history with detailed clinical examination finding were recorded over a period of six months.*
Result And Discussion :*Out of 30 patients, 11 (36 %) patients were between age group of 20 to 40 years of age. Most common symptom was painful scrotal swelling (18 pt-60 %). Most common pathology was epididymo-orchitis which was seen in 12 patients (40 %) followed by hydrocele 5 (17 %) and varicocele 5 (17%).*
Conclusion: *High frequency ultrasonography 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.It is also highly sensitive in differentiating solid from cystic scrotal masses, intratesticular from extratesticular origin of scrotal masses.Highfrequency ultrasonography with doppler is highly sensitive in demonstrating the varicoceles. Role of CT is limited here, by which it can provide information only about the spread of testicular tumor.*
Key Words: *ColorDoppler,Epididymo-orchitis,Scrotum,UltrasoundVaricocele*

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I. Introduction

Scrotum is an organ which contains right and left testis , epididymis and lower part of the spermatic cord.Scrotum is divided into right and left parts by a ridge or median raphe, which is continued forwards on to the undersurface of penis and backwards along midline of peritoneum to the anus.Thetestis is separated from examining fingers by little more than few mm which covers of loose skin and fibro muscular tissue , so it is most accessible for clinical examination. Clinical examination of scrotal swelling by physical examination sometimes may be inadequate because of tenderness , swelling and gross distortion of scrotal contents.Clinical signs and symptoms are mostly variable, misleading and non specific.Previously clinical evaluation of scrotum was done by palpation and trans –illumination.Now a days the diagnostic modalities are gray scale USG, Doppler study and MRI.

CT scans and MRI have certain limitations in the evaluation of scrotal disease. Main disadvantage of CT scan is that it gives radiation to gonads , while MRI is very costly and generally not readily available.USG is non invasive , inexpensive and can be correlated easily with patients signs and symptoms and that is too without risk of ionizing radiation.The study is done to evaluate usefulness of high frequency gray scale ultrasound and color Doppler study for evaluation of various scrotal pathologies.

II. Materials And Method

Prospective study of 30 patients was done who were referred to radiology department of our hospital for scrotal pain / swelling / pathology. Study was conducted for a period from April 2019 to September 2019 after approval of ethical committee.

Inclusion criteria :

- Patient of any age
- All cases with clinical manifestations of scrotal diseases
- New born patient with suspectingundescendtestis.
- Suspecting testicular torsion

Exclusion criteria :

-Hemodynamically unstablepatients,
-Patient with inguinal hernia

Patientsdetails , brief clinical history and physical examination findings were obtained after that patient underwent sonography examination.
The study was performed using 7.5 to 11 MHz linear tranducer.GE logiq P5 ultrasound and doppler was used.The color Doppler sonography was routinely performed in all patients.Highfrequency tranducer is usually used for evaluation of the testes and scrotum, except in certain circumstances (e.g -massive hydrocele) for which lower frequency tranducer was used.
Abdominal ultrasonography was performed in conjunction with the scrotal scans using 3.5 to 5 MHz convex curved tranducer , whenever required , like in suspected patients of tubercular epididymoorchitis, patients with testicular malignancy and patients with varicocele.

Ultrasound scanning technique :

-Patient in supine position.
-Patient in upright position when looking for varicocele.
-Scrotum was supported on a towel laid over the thighs.
-Initially gray scale evaluation was performed in both long and short axis.
-After gray scale evaluation, color Doppler study was performed.

Color and spectral Doppler parameters were set for low flow power Doppler which might be helpful to diagnose testicular torsion.
•Important**:** both a short axis gray scale and a color Doppler image should be obtained with imageof both testicles at the same time ("buddy shot" or "sunglasses view"), to compare size, relative echogenicity and blood flow.
•Ultrasound in standing position with Valsalva maneuver was performed in varicocele patients.
Followings points were noted in ultrasound examination:
–Size,
–Shape,
–Echotexture
–Vascularity (on color and power Doppler mode) of testis and epididymis was examined routinely in all cases.

•**In a case of focal scrotal lesion**, in addition to above-mentioned parameters,
–location (intratesticular/extratesticular),
–laterality (unilateral/bilateral),
–margin and
–Presence of any calcification was noted.

•Thickness and vascularity of the cord and also the thickness, echotexure and vascularity of scrotal skin was routinely examined.
•Any collection in scrotal sac and its nature was evaluated.

Subsequently these cases were followed up and correlated with either surgical findings, response to treatment or follow up scans wherever applicable.

III. Result

30 cases of scrotal swellings were studied with real time High frequency ultrasonography and color Doppler sonography.
•Majority number of patients with scrotal pathologies were between age group of 20 to 40.
•Commonest clinical presentation was painful scrotal swelling, which alone constituted 60% (18 patients) of all pathologies followed by painless scrotal swelling constituting approximately 32 % (09 patients).

Table I

Clinical complaints	Number of Patients	Percentage of Patients (%)
Painful scrotal swelling	**18**	60
Painful swelling with history of trauma	2	5
Painless scrotal swelling	**09**	32
Pain without swelling	1	3

•**Inflammatory pathologies** were most common which was seen in 19 patients (64%) whereas non-inflammatory pathologies were seen in 11 patients (36%).

Table II

Type of pathology	Number of Patients	Percentage of Patients (%)
Inflammatory	**19**	64
Non-inflammatory	11	36

Most of the diagnoses were epididymitis or epididymo-orchitis, hydrocele, varicocele, orchitis,testicular torsion, and hematocele.
•Color Doppler ultrasonography accurately diagnosed all cases of epididymitis or epididymo-orchitis, testicular torsion, varicocele, and hydrocele.

Pathology	Number of Patients (Clinical/surgical diagnosis)	Ultrasound Diagnosis
Epididymitis, epididymo-orchitis, orchitis,abscess	18	17
Testicular Torsion	1	1
Other (hydrocele, varicocele, hematocele,)	11	12

Ultrasound diagnosis of acute scrotum

Case 1- Epididymo-orchitis
•22 years old male
•presented with complain of scrotal pain, swelling and fever

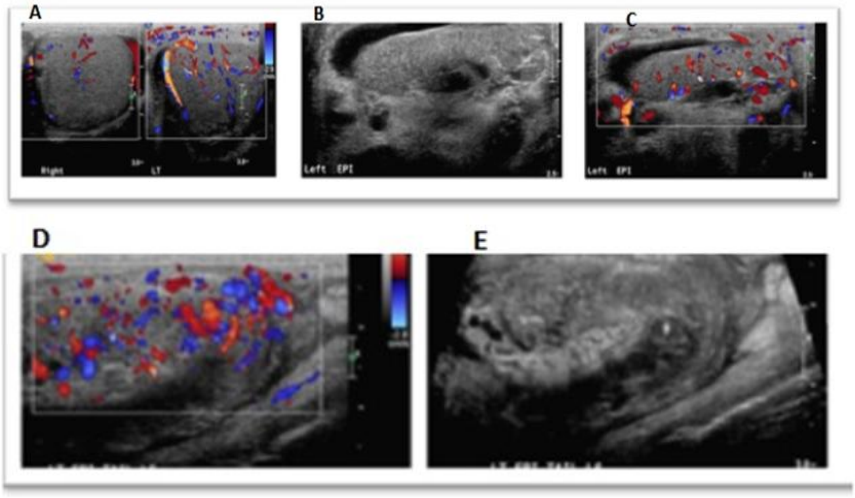

Fig. a: The unaffected right testis (left image) displays normal vascularity, while the affected left testis (right image) displays increased vascularity and is slightly enlarged.

Fig. b: The left epididymis has an enlarged appearance

Fig. c & d: The entire left epididymis shows increased vascularity on Colour Doppler.

Fig. e: The left epididymal tail has an enlarged and heterogeneous appearance

Fig.1 Left epididymis and testis appears enlarged with heterogeneous in echo texture and Increased vascularity.**The features are consistent with epididymo-orchitis.**

Case 2-varicocele
•26 years old male
•with complaint of left scrotal swelling without pain

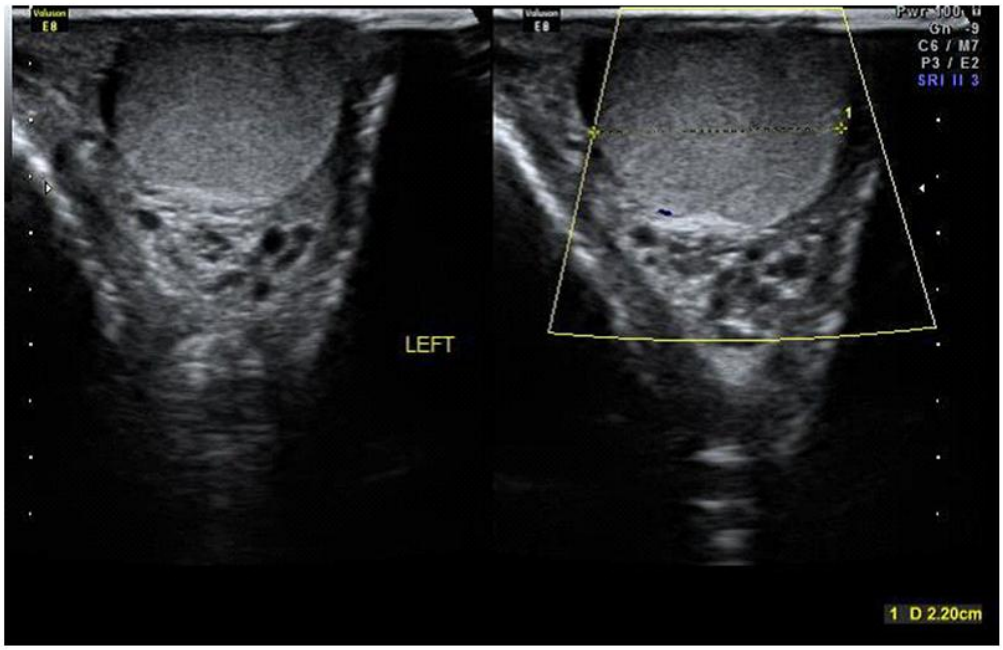

Fig .1 Left scrotum : prominent anechoic vascular channels of left pampinifom plexus.

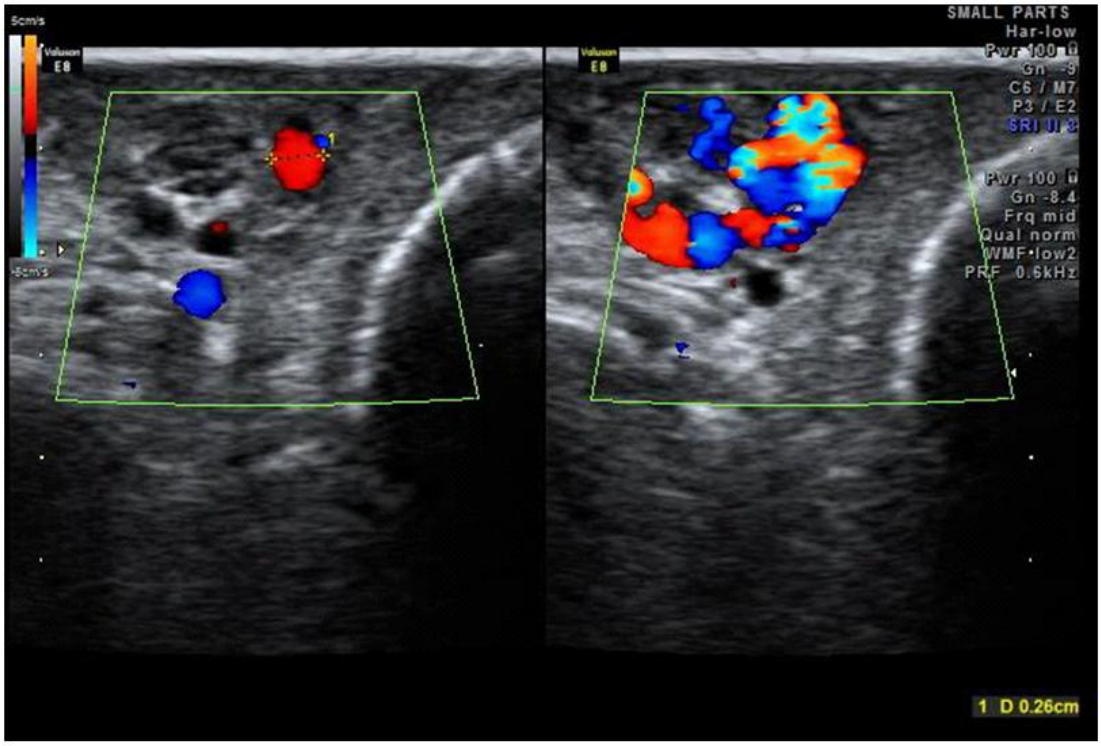

FIG.2 Left scrotum : prominent anechoic vascular channels of left pampinifom plexus. On color Doppler : color flow + & On Valsalva maneuver : reflux +.

Case 3-hydrocele

•35 years old male
•with complain of painless right scrotal swelling

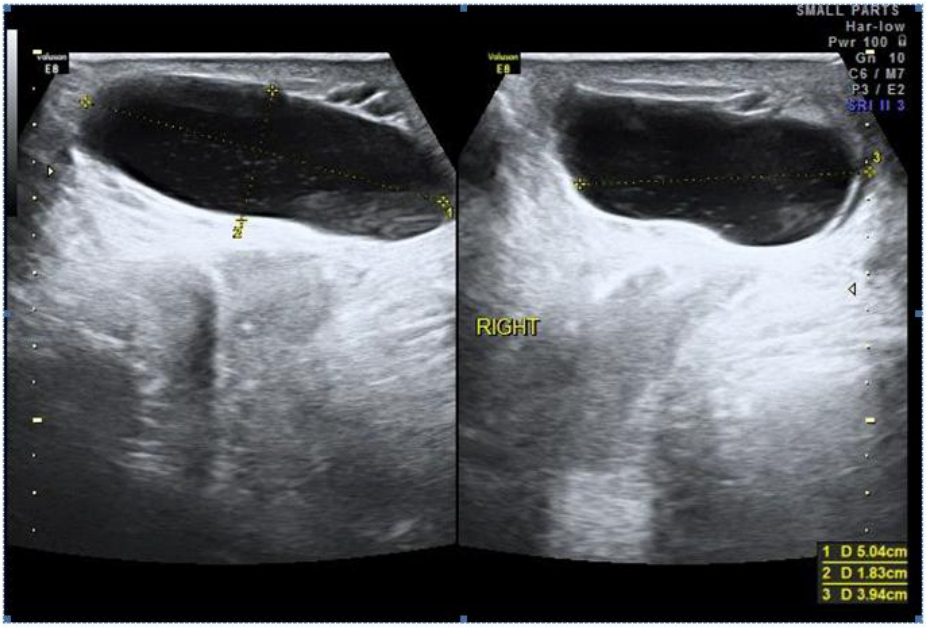

Fig.1 Right scrotum : Anechoic fluid in right TV sac with fine internal echoes within it.

Case 4 -Epididymitis with funiculitis with reactive hydrocele with epididymis abscess

•35 years old male
•Complain of painful right scrotal swelling with fever

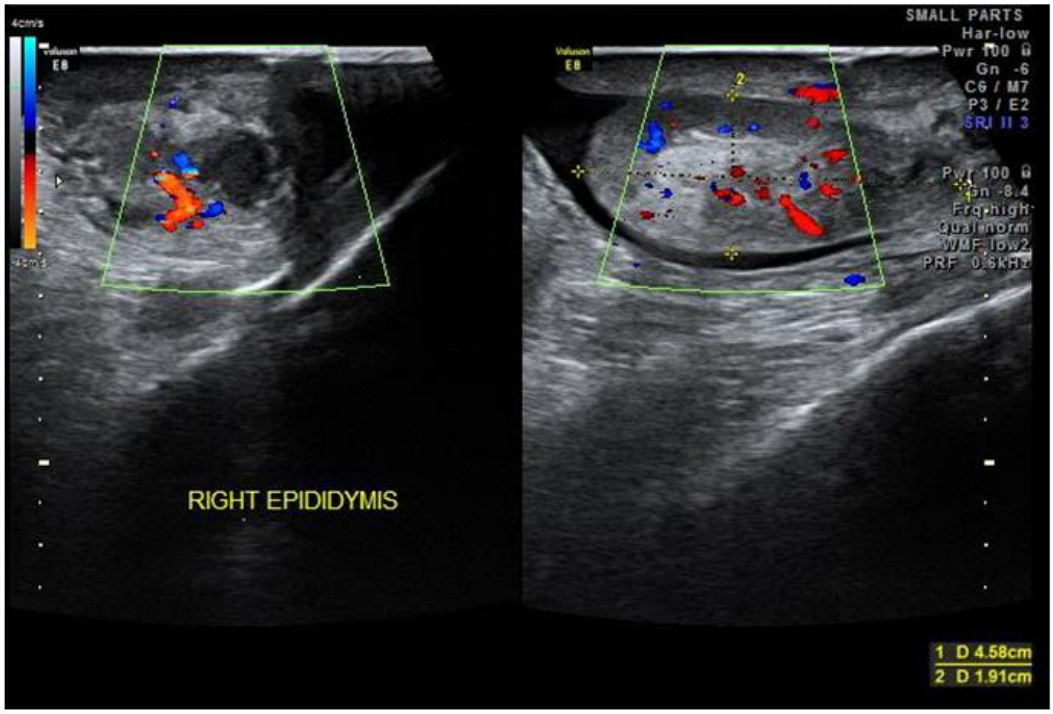

Fig 1. Right epididymis bulky in size and Heterogeneous in echo texture
Increased vascularity on doppler study
Focal hypo echoic area without internal vascularity within it-abscess

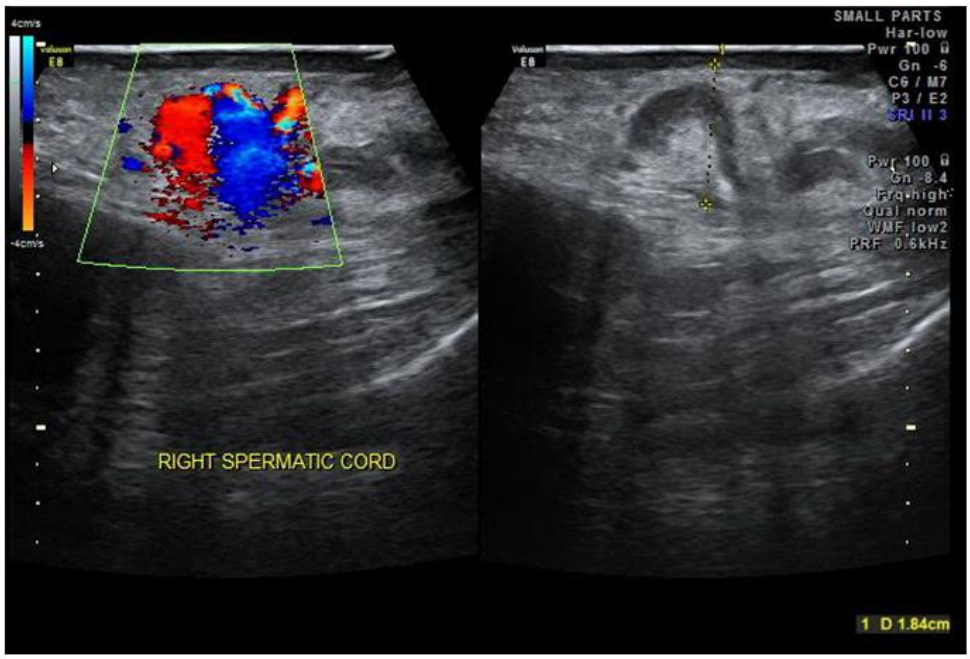

Fig 2. In above image -Right spermatic cord thickened and Heterogeneous in echo texture with Increased vascularity on color doppler study.

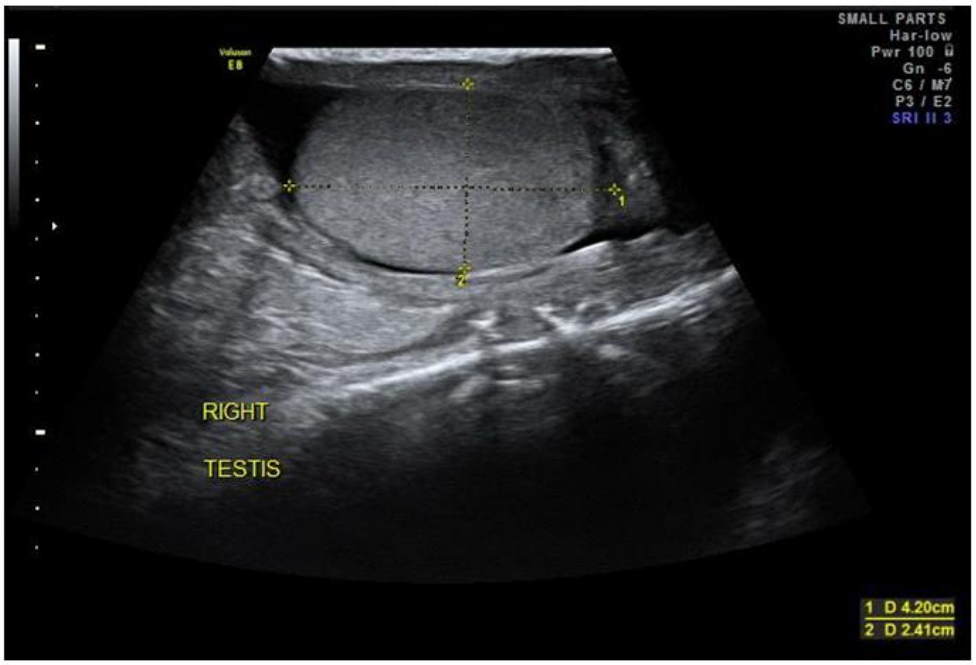

Fig 1.Right testis appears normal

Right side reactive hydrocele.

IV. Discussion

The present study was done to evaluate the role of highresolution sonography, color flow index and power Doppler in the evaluation of scrotal pathology. A total of 30 patients from all age groups with signs and symptoms related to scrotal disease have been included in this study.

Out of total 30 patients most of the patients are between age group of 20 to 40.Most common clinical presentation was painful scrotal swelling which found in 18 patients (60 %) followed by painless scrotal swelling which found in 09 patients (32 %) followed by painful swelling with history of trauma found in 2 patients (5%) followed by pain without swelling found in 1 patient (3 %). [1]

Most commonpathologies were Inflammatory which was seen in 19 patients (64%)[2]whereas non-inflammatory pathologies were seen in 11 patients (36%)[3].

Here in our study most common pathologies were epididimoorchitis found in 17 patients followed by hydrocele found in 8 patients ,varicocele found in 9 patients, testicular torsion found in 1 patients , abscess found in 2 patient.[4].

In Arger et al, in a series of 62 patients , inflammatory etiologies found in 16 cases and non inflammatory etiologies found in 45 cases.In our study in a series of 30 patients ,inflammatory etiologies found in 19 cases and non inflammatory etiologies found in 11 cases.

In Willscher et al,in a series of 43 patients , inflammatory etiologies found in 12 cases and non inflammatory etiologies found in 28 cases.In our study in a series of 30 patients , inflammatory etiologies found in 19 cases and non inflammatory etiologies found in 11 cases.

In Arger et al study most common pathologies were epididimoorchitis found in 30 patients followed by varicocele found in 12 patients ,varicocele found in 5 patients, testicular torsion found in 5 patients ,epididymal cyst found in 3 patient, abscess found in 3 patient ,hematocele found in 3 patient , testicular mass found in 1 patient.In our study ,most common pathologies were epididimoorchitis found in 17 patients followed by hydrocele found in 8 patients ,varicocele found in 9 patients, testicular torsion found in 1 patients , abscess found in 2 patient.

In Willscher et al study most common pathologies were epididimoorchitis found in 25 patients followed by testicular torsion found in 6 patients, hydrocele found in 5 patients, varicocele found in 04 patients,epididymal cyst found in 3 patient. In our study ,most common pathologies were epididimoorchitis found in 17 patients followed by hydrocele found in 8 patients ,varicocele found in 9 patients, testicular torsion found in 1 patients , abscess found in 2 patient.

The most common pathology is infective etiology- epididimoorchitis[5, 6,7,8 and 9].

V. Conclusion

High frequency ultrasonography and color Doppler scan is non-invasive, easily available, relatively affordable , readily available , repeatable and without risk of radiation, is an effective diagnostic imaging modality which is suitable for both diagnosis and follow up of various scrotal pathologies.

It is also highly sensitive in differentiating solid from cystic scrotal masses and intratesticular from extratesticular origin of scrotal masses.

High frequnency ultrasonography with doppler is highly sensitive in diagnosing varicoceles and it is the most preferred investigation of choice in case of infertility.

We conclude that high frequency ultrasonography and color doppler plays an important role in the diagnosis and proper management planning of the scrotal disorders.

Conflicts of interest :

The Authors declare no conflict of interest related to this manuscript.

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