

Original article:

Role of high resolution ultrasonography and Color Doppler in scrotal pathology

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Abstract:

Introduction: The purpose of this study was to evaluate the role of high resolution ultrasound and color doppler in diagnosis of scrotal pathology and to study the patterns of duplex sonography of scrotal pathologies.

Material and methods: 100 cases with history any clinical manifestation of any scrotal pathologies, who were referred to Radiology Department for scrotal ultrasonography and Doppler study by Department of Urology, Department of Surgery and NIMS city center, Jaipur. Cases of any age group were included in this study. After the history, physical examination and duplex scanning a diagnosis was made. Color Doppler and Power Doppler was applied in order to study the vascularity of the lesion. In this study, grey scale real time Ultrasonography and Color Doppler of scrotum was performed by using GE VOLUSON 730 PRO machine with high frequency probe of frequency 7-10 MHz linear transducer and abdominal ultrasonography was done using 3.5- 5 MHz convex curved array transducer.

Results: In our study, different pathologies of scrotum were included out of which inflammatory lesion (40%) accounts for maximum number of cases followed by testicular neoplasm (14%), varicocele (9%), undescended testis (4%), trauma (5%), primary hydrocele (7%), testicular torsion (10%) and miscellaneous (11%). Most of the patients were aged between 20-40 years with chief complaints of scrotal swelling alone (34%) followed by scrotal swelling and pain (27%). Acute Epididymitis (25%) alone was the most common inflammatory lesion.

Conclusion: Ultrasonography was found to be a safe, simple, rapidly performed modality with a high accuracy in diagnosing scrotal pathologies. It provides meaningful pre-operative diagnosis. Hence the present study, recommends the use of ultrasonography (especially with high frequency probes for better resolution) for the evaluation of scrotal pathologies.

Key words: HRUS scrotum, Scrotal pathologies.

Introduction

Since the ancient times scrotal pathologies have been cause of apprehension and anxiety on part of both the patient and clinician. Any solid lesion of the testis evokes the suspicion of malignancy in the clinicians mind as all testicular masses should be considered potentially malignant until proven otherwise¹.

In the clinical examination of the scrotal swelling, physical evaluation by itself may be inadequate due to tenderness, swelling or gross distortion of scrotal contents. 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 interpreted².

Imaging provides information that is unavailable from clinical examination, such as those of scrotal masses or inflammation³. Ultrasonography performed with a high-frequency transducer and the use of pulsed and color Doppler modes is the imaging modality of choice for evaluating acute and non-acute scrotal disease. Many of the disease

processes, including testicular torsion, epididymo-orchitis, and intratesticular tumor, produce the common symptom of pain at presentation, and differentiation of these conditions and disorders is important for determining the appropriate treatment. US with a high-frequency transducer helps to better characterize intrascrotal lesions, and in many instances the findings suggest more specific diagnoses⁴. MRI gives the detailed anatomic imaging and provides a certain degree of tissue specificity. However, MRI is not easily available and its high cost resulting in its limitation for routine examination. Ultrasonography combining gray scale and color techniques, is irreplaceable in the diagnostic work-up of scrotal masses, while MRI can serve as a problem solving diagnostic modality⁵.

Ultrasonography is simple to perform, rapid, non-invasive, relatively inexpensive, easily reproducible, widely available and does not provide radiation to gonads⁶.

Material and methods

The ethical committee of our institute approved this prospective study. Informed consent was taken from all patients undergoing this study. We prospectively studied 100 patients over a period of 14 months starting from April 2014. All patients who had any clinical manifestation of any scrotal pathologies were included in the study. Patients excluded from the study were those, who were hemodynamically unstable and who didn't give the consent for examination.

Findings of specific local examination were recorded in detail and a clinical diagnosis was established in all the cases. Initial clinical evaluation was done by respective department from where patients were referred to our department and their probable diagnosis were also recorded.

Equipment:-

In this study, grey scale real time Ultrasonography and Color Doppler of scrotum was performed by using GE VOLUSON 730 PRO machine with high frequency probe of frequency 7-10 MHz linear transducer and abdominal ultrasonography was done using 3.5- 5 MHz convex curved array transducer.

Scanning Technique:-

Scanning was routinely performed in supine position after elevating scrotum using a towel draped over thighs, and the penis is placed on the patient's abdomen and covered with a towel. Both hemiscrotum were examined in transverse, sagittal and oblique planes. Scanning was done with patient in upright position and during Valsalva maneuver wherever indicated e.g. varicocele and inguinal hernia. Additional scans of spermatic cord in region of scrotal neck and inguinal canal region were obtained in special circumstances like undescended testis, encysted hydrocele of cord and varicocele. Scrotal lesions were assessed by the following US criteria:

1. Unilateral/Bilateral.
2. Location- Intratesticular/Extratesticular.
3. Dimensions and Shape.
4. Borders (well defined/ill defined).
5. Echotexture (hyperechoic, isoechoic and hypochoic).
6. Echostructure (the degree heterogeneity).
7. Calcifications.
8. Vascularity on Color and power Doppler mode.

Diagnosis & Follow up:

After the history, physical examination and duplex scanning a diagnosis was made. Color Doppler and Power Doppler was applied in order to study the vascularity of the lesion.

Final diagnosis was based on surgery, fine needle aspiration cytology and follow-up scan after conservative management.

Results

In our study, different pathologies of scrotum were included out of which inflammatory lesion (40%) accounts for maximum number of cases followed by testicular neoplasm (14%), varicocele (9%), undescended testis (4%), trauma (5%), primary hydrocele (7%), testicular torsion (10%) and miscellaneous (11%). Most of the patients were aged between 20-40 years with chief complaints of scrotal swelling alone (34%) followed by scrotal swelling and pain (27%). Acute Epididymitis (25%) alone was the most common inflammatory lesion. There were 4 cases of undescended testis which were correctly localized in the inguinal canal. All cases of testicular torsion and trauma were correctly diagnosed by ultrasonography where clinical examination is not possible due to severe tenderness. 3 cases (60%) out of the 5 testicular tumor were seminoma, were correctly diagnosed on sonography, while rest of the 2 cases (40%) could not be designated specific type though diagnosed as malignancy on sonography.

Discussion

Pathologies observed in present study of 100 patients are as follows:

Sr. No.	Disease	No. of Cases	Percentage (%)
1.	Inflammatory Disease	40	40%
2.	Varicocele	9	9%
3.	Undescended Testis	4	4%
4.	Trauma	5	5%
5.	Neoplastic	14	14%
6.	Primary Hydrocele	7	7%
7.	Testicular Torsion	10	10%
8.	Miscellaneous	11	11%

Inflammatory lesions on ultrasonography were seen as enlarged epididymis with decreased echogenicity and coarse pattern. Secondary

Scrotal complaints are a common reason for urologic consultation. Although history and physical examination are important, the findings are often equivocal and imaging is required to establish the diagnosis. The introduction of high resolution ultrasonography has provided a rapid, non ionizing and non invasive means of diagnosing scrotal pathology (Krone et al, 1985)¹. This study was undertaken to evaluate the role of ultrasonography and color doppler in diagnosis of scrotal pathologies.

In our study, the most common presenting feature was scrotal swelling (34%) followed by scrotal swelling and pain.

In our study, inflammatory lesions accounts for the maximum number of cases (40%), which correlated with the previous studies done by Showker et al, 1976, Gottesman et al, 1977^(7,8).

The Ultrasonographic findings were evaluated in view of the clinical findings, and then these ultrasonography findings were correlated with the final diagnosis. The final diagnosis was confirmed by surgery in 44 patients, FNAC in 10 patients and follow up scan in the rest of the patients after conservative treatment.

hydrocele was also seen in 15 cases (68.18%) which is comparable to that of Arger et al, 1981 (80%)⁹.

There were 14 cases (14%) of testicular neoplasm in our study. 9 cases (64.29%) were benign and 5 cases (35.71%) were malignant. Among benign lesions epididymal cyst (55.56%) was the most common lesion. Testicular malignancy was diagnosed sonographically in 6 cases. Five of them proved to be malignant whereas the sixth one proved to be chronic non-specific inflammation of the scrotal contents which appeared as an altered size of the testis and epididymis with septated collection in the tunica, all this was present for a long duration. This case was wrongly diagnosed as testicular tumor, which was later confirmed by FNAC and was found to be chronic nonspecific infection of the testis and epididymis.

The age ranges from 44 to 61 years in patients with testicular tumour. Several other authors have also demonstrated a peak incidence of testicular tumour in the fourth and fifth decade (Krone et al 1985; Benson et al 1989)^{1,10}.

We encountered 4 cases (4%) of undescended testis in present study. 2 cases (50%) of these were on right side, 1 case (25%) on left side & 1 case (25%) on both sides. All cases of undescended testis were presented in first decade and testis were localized correctly in the inguinal canal by ultrasonography which is comparable with previous studies (Hederstrom et al,1985, Johansen et al, 1988)^{11,12}.

There were 5 cases of Scrotal trauma (5%) which were correctly diagnosed by sonography. Prompt diagnosis of a ruptured testis is crucial because of the direct relationship between early surgical intervention and testicular salvageability. Approximately 90% of ruptured testicles can be saved if surgery is performed

within the first 72 hours, whereas only 45% may be salvaged after 72 hours. Clinical diagnosis is often impossible because of marked scrotal pain and swelling, and sonography can be valuable in the assessment of tunica albuginea integrity and the extent of testicular hematoma¹³. There were 10 cases of testicular torsion (10%) which were also correctly diagnosed in present study. 8 cases (80%) were diagnosed as torsion of testis and 2 cases (20%) were diagnosed as torsion of appendix of testis. 7 cases showed heterogeneous echotexture and 3 cases showed homogenous echotexture on grey scale imaging. All cases of torsion showed absence of blood flow on color doppler imaging. Similar finding was seen by Vijayaraghavan SB, 2006¹⁴.

Out of 100 cases, there were 6 cases (6%) of scrotal hernia, 3 cases (3%) of filaria and 2 cases (2%) of Non-specific scrotal edema. Among these 6 cases of scrotal hernia 1 case (16.67%) was found bilateral. 2 cases (33.33%) of scrotal hernia showed associated secondary hydrocele. All cases of filaria showed dilated lymphatic channels with dancing filarial sign.

Conclusion

Ultrasonography was found to be a safe, simple, rapidly performed modality with a high accuracy in diagnosing scrotal pathologies. It provides meaningful pre-operative diagnosis. Hence the present study, recommends the use of ultrasonography (especially with high frequency probes for better resolution) for the evaluation of scrotal pathologies.

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