



ROLE OF HIGH RESOLUTION ULTRASOUND AND COLOUR DOPPLER IN ASSESSMENT OF SCROTAL PATHOLOGIES AT A TERTIARY CARE HOSPITAL OF NORTHEAST INDIA

Radio-Diagnosis

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ABSTRACT

Aim: To assess the role of high resolution ultrasonography and Colour Doppler as a primary modality in the diagnosis and follow up of patients presenting with scrotal pathologies. **Methods:** Hospital based observational study comprised of 70 patients who were referred to the department of Radiodiagnosis of Assam Medical College and Hospital with clinical manifestation of scrotal diseases. All patients were scanned with the linear probe on the ultrasound machines Samsung USG machine Samsung RS 80A Prestige, Samsung healthcare with a 10 to 15 MHz frequency transducer for a period of one year. Sensitivity and specificity are calculated. Analysis are done using MS excel Version 2010. **Results And Discussions:** The most commonly involved age group was 30 to 39 years (n=22; 31.43%). Swelling was the most common symptom. On USG, the most common scrotal pathology encountered was hydrocele (n=25; 30.86 %) followed by epididymal cyst (n=10; 12.34%), among inflammatory most common was epididymo-orchitis (n=6; 8.5%). Of 6 subjects diagnosed as testicular malignancy on CDUS, only 5 were subsequently found to have malignancy. 1 case of orchitis was wrongly diagnosed as malignancy. **Conclusion:** High-frequency ultrasonography is a useful diagnostic tool for scrotal and testicular disorders. Scrotal sonography can clearly distinguish between testicular and extratesticular lesions and it should serve as a primary modality of investigation for the diagnosis of scrotal pathologies.

KEYWORDS

Torsion; Epididymo-orchitis; Varicocele; Hydrocele; seminoma.

INTRODUCTION

Radiologists are essential when making a diagnosis of testicular and scrotal disease, as ultrasound is a crucial imaging modality due to its ability to reveal detailed anatomical features and assess vascular perfusion. Ultrasonography has the ability to recognize and classify intra- or extratesticular lesions, differentiate between benign and malignant lesions, and identify diseases that call for urgent surgical intervention.¹

The investigation of the scrotum and its contents is particularly well adapted to ultrasound technology. Sonography does not expose the gonads to radiation and is quick, noninvasive, affordable, easily reproducible, and widely available. Sometimes emergency scrotal Doppler scans are required to diagnose testicular torsion.²

The present diagnostic armamentarium for scrotum imaging includes gray scale ultrasonography, Doppler studies, Computed Tomography & Magnetic Resonance Imaging, radioisotope studies and testicular angiography, but CT and MRI have limitations when assessing scrotal disorders.

This study will investigate the role of High frequency Ultrasound in accurately distinguishing between testicular and extra testicular pathology of scrotum.³

AIMS:

To assess the role of high resolution ultrasonography and Colour Doppler as a primary modality in the diagnosis and follow up of patients presenting with scrotal pathologies.

OBJECTIVES:

To study the clinicoradiological spectrum of inguinoscrotal lesions using colour Doppler.

To compare the ultrasonographic observations with operative and histological findings when necessary.

MATERIALS AND METHODS:

The subjects of this observational study were 70 patients attending the outpatient department of Assam Medical College and Hospital with clinical features of scrotal diseases. Study was done for 12 months.

Inclusion Criteria:

All patients presenting with clinical manifestation of scrotal diseases referred to the department of Radiodiagnosis of all age groups and which are diagnostic of scrotal diseases on final outcome.

Exclusion Criteria:

1. Medical conditions like nephrotic syndrome, hypoproteinemia, angioneurotic oedema & insect bite.
2. All patients unwilling to undergo the examination
3. All postoperative patients of scrotal surgeries
4. Post radiotherapy patients.

Ethical Committee Approval:

Ethical clearance was taken from the Institutional Ethics Committee(H), AMCH. All patients were given information outlining the experimental protocol and all the patients signed a consent form prior to entering the study.

METHODOLOGY:

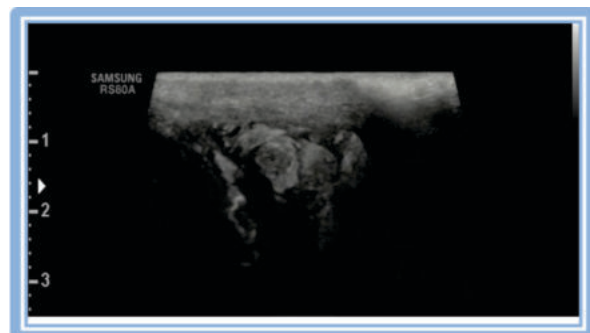
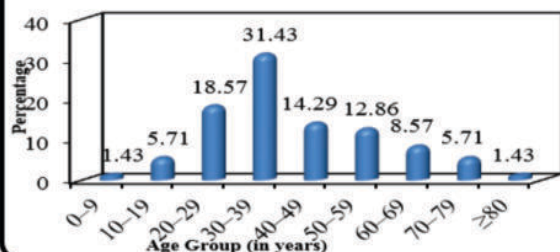
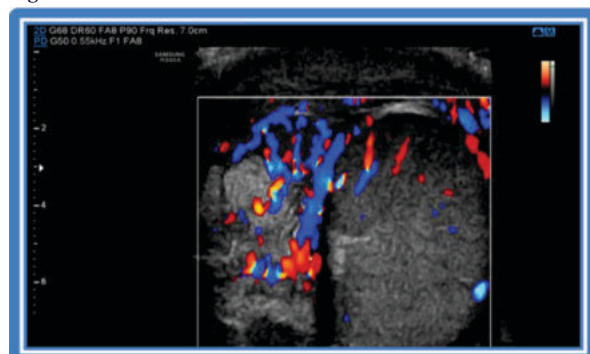
A structured pre-prepared case proforma was used to enter patient details such as serial number, name, age, sex, address, hospital/MRD number, date of admission and examination. A thorough case history was performed prior to the clinical examination.

Ultrasonography was performed using Samsung USG machine Samsung RS 80A Prestige, Samsung healthcare with a 10 to 15 MHz frequency transducer.

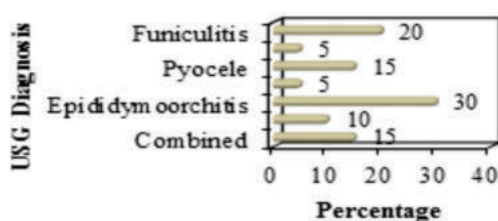
Scanning was routinely performed in supine position, after elevating scrotum using a towel draped over thighs, and the penis placed on the patient's abdomen and covered with a towel. The ultrasound findings were then confirmed with surgical findings, histopathology reports, response to treatment or follow up scans.

Statistical Analysis & Results:

Categorical data are presented in terms of frequency level, percentages, charts and diagrams were also drawn wherever necessary. Sensitivity and specificity are also calculated. Analysis are done using MS excel Version 2010.

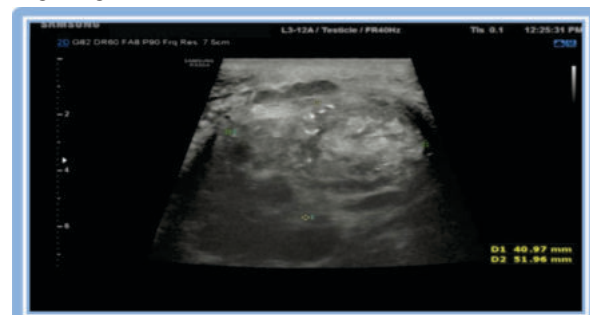
Figure 1: Distribution of patients according to various age groups**Case 1: Indirect inguinal hernia showing herniated omental content and free fluid through the internal inguinal ring filling the inguinal canal.****Case 2: Enlarged testis and epididymis with heterogeneous texture, interstitial oedema and mildly increased vascularity with no focal lesions****RESULTS:**

This study found that hydrocele (n=25, 30.86%) is the most common benign cause of scrotal swelling, followed by epididymal cyst and spermatocele which are incidental findings when small. Ultrasonography was used to detect hydrocele and other benign cases, and USG diagnoses were matched with surgical findings in 36 cases and one case of sebaceous cyst of the scrotal wall where histological examination was matched. As a result, the sensitivity of ultrasonography in detecting hydrocele and other benign cases is 100%. In inflammatory cases, epididymo-orchitis (n=5) was the most common lesion accounting 30.0% of the total 20 cases, and the sensitivity of ultrasonography in inflammatory lesions was 94.73%.

Figure 2 Spectrum of inflammatory cases on US

nature. Lymphoma showed enlarged testis with diffuse hypoechogenicity. All 9 subjects with diagnosis of testicular mass were subjected to histopathology.

5 out of 6 patients turned out to be seminoma while 1 misdiagnosed subject turned out to be orchitis. 3 out of 9 clinically diagnosed cases of testicular mass were labeled as orchitis on US. However, histopathology results showed one of them to be seminoma. Ultrasonography was 83.3% sensitive and 66.7% specific in diagnosing testicular masses.

**Case 3: High frequency and colour Doppler US image of testicular seminoma showing irregular, well-defined, heterogeneous hypoechoic lesion in left testis with intralesional calcification and minimal vascularity**

Out of the 3 traumatic lesions, 1 case each of hematoma, testicular rupture and hematocele. all 3 cases were underwent surgery and surgical findings were matched with USG findings. So, sensitivity is 100%.

In our study, 1 case of cryptorchidism was found. All the 3 cases of scrotal hernia were followed up and were matched with surgical findings.

Out of 2 cases of scrotal hernia, 1 showed normal vascularity of bowel loops and 1 case was with no vascularity. Out of the 4 isolated cases of varicocele, 3 cases were grade 2 and 1 case was grade 3. 2 case of testicular torsion presented with infarction of both testis which was confirmed on operation table. 1 case of atrophic testis presented showed heterogeneous echotexture without any vascularity. 1 case with scrotal filariasis showed linear hyperechoic moving structures in the spermatic cord lymphatics showing dancing filariae sign. Final diagnosis of all cases were matched with USG diagnosis. So, sensitivity of ultrasonography in our study is 100%.

DISCUSSION

We divided the 81 cases into benign, malignant, inflammatory, developmental, traumatic and miscellaneous conditions.

Among non-neoplastic scrotal swellings, hydrocele is the commonest pathology noted 25 cases (33.7%). Out of 25 cases, hydrocele was noted unilaterally in 17 cases, bilateral in 8 cases. These findings are in similarity to previous studies of **Arger PH et al(1981)⁴**, and **Rizvi SAA et al⁵**

In inflammatory causes we included epididymo-orchitis, epididymitis, orchitis, scrotal wall abscess and pyocele. There were 2 patients (14.2%) diagnosed with acute epididymitis. USG features seen were enlarged epididymis in those 2 patients (100%). A similar study done by **Smith et al⁶** reported an increased incidence with respect to the enlarged epididymis. We observed diffuse hypoechogenicity with diffuse increase in vascularity and epididymis size in two cases of acute Epididymo-orchitis, similar to **Horstman et al⁷** and **Farriol et al⁸**. Our study found that 7.4% of malignant lesions were germ cell tumors, with 83.3% being seminomatous and 20% being non-seminomatous. Seminomas were well defined and homogeneously hypoechoic, while non-seminomatous were heterogenous with cystic areas. These findings were correlated with the study done by **McDonald MW et al.⁹**

Our study found that 9 subjects with diagnosis of testicular mass were subjected to histopathology, with 5 out of 6 patients being seminoma and 1 misdiagnosed subject being orchitis. Ultrasonography was 83.3% sensitive and 66.7% specific in diagnosing testicular masses,

with 90% of seminomas appearing as solid, homogenous, hypoechoic, and hypervascular lesions compared to normal testicular tissue which is compatible with the study carried out by **Derouet H et al**¹⁰.

3 cases of scrotal and testicular trauma were detected. The etiology of trauma included sports injury, road traffic accident, and unilateral injury. **Cass et al**¹¹ and **Schuster G et al**¹² had stated that right sided traumas are more common. On high frequency US scan, 1 case of hematocele appeared as anechoic collection without any internal septations or sediments, and one case of testicular hematoma appeared as irregular hypoechoic region within left testis adjacent to normal echoic testis. Ultrasound is an ideal method of assessing for testicular rupture with 100% sensitivity. All these findings were correlated with study done by **Yusuf GT and Sidhu PS**¹³ where they concluded that ultrasonographic appearance of testicular rupture is disruption of the normal echogenic tunica albuginea lining with extrusion of the parenchyma.

Scrotal hernias are common conditions in older age group with mesentery and bowel loops with its contents. Ultrasonography was 100% sensitive in detecting hernias. Varicoceles are common causes of male infertility and were diagnosed in 4 cases. 2 cases of torsion were diagnosed in a 20 year and 25 old male patient with diffusely hypoechoic testis without vascularity. One case of atrophic testis was diagnosed with past history of trauma and showed heterogenous echotexture without any vascularity. The findings were correlated with the study of **G. T. Yusuf and P. S. Sidhu**¹³ where they concluded that Colour Doppler is 82% sensitivity and 100% specificity for torsion.

We diagnosed 1 case of developmental abnormality with a cryptorchid testis in the inguinal canal in a 3 year old male patient. Ultrasonography was 100% accurate, and the testis was smaller in size and homogeneously hypoechoic. This study was correlated with **Hasan Z et al (2011)**¹⁴.

CONCLUSION:

High-frequency sonography and colour Doppler sonography are useful diagnostic tools for scrotal and testicular disorders, as they can clearly distinguish between testicular and extra-testicular lesions and should serve as a primary modality of investigation. High-frequency ultrasonography can distinguish between solid and cystic scrotal masses with great sensitivity, while color Doppler is highly sensitive at detecting varicoceles. The benefits of High Frequency US and Color Doppler include non-invasiveness, lack of ionising radiation, ease of use, accessibility, affordability, and repeatability.

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