ORIGINAL ARTICLE

Significance of Scrotal Ultrasound in patients with Testicular Pathologies

SHOAIB AKHTAR[1], MUHAMMAD ZAIN UL ABIDIN[1], MUHAMMAD YOUSAF[1], MUHAMMAD YOUSAF FAROOQ[1]MUHAMMAD AHSAN AKHTAR[1], MUHAMMAD ALI[1], SALMAN KHAN[1], AFTAB ALLOUDIN[1], MUHAMMAD ASAD ALAM[1], MUHAMMAD BILAL[1].

[1]University Institute of Radiological Sciences and Medical Imaging Technology
Faculty of Allied Health Sciences the University of Lahore , Lahore Pakistan
Correspondence to Dr Muhammad Zain Ul Abidin. E-mail: zainrao750@gmail.com, Contact No: +92302-4848052

ABSTRACT

Background: Scrotal pain is a relatively frequent complaint confronting physicians in an emergency setting, and one that harbors potentially serious implications. Accurate diagnosis of testicular torsion and prevention of testicular infarction are of utmost concern in these patients. Scrotal ultrasound is best diagnostic tool to detect and monitor of testicular aberrations in boys.

Aim: To determine the significance of scrotal ultrasound in patients with testicular pathologies.

Place and duration of study: Rahim Yar Khan Diagnostic Center from 1st May 2019 to 31 December 2020

Methodology: A descriptive study was conducted at Rahim Yar Khan Diagnostic Center. Data of 96 participants were designated done suitable sample method. SPSS version 21.0 was used for data analysis.

Results: Out of 96 patients, in which 74 patients (77.1%) had swelling, 22 patients (22.9%) had no swelling, 82 patients (85.4%) had trauma, 14 patients (14.6%) had no trauma, 88 patients (91.7%) had pain, 8 patients (8.3%) had no pain, 19 patients (19.8%) had both sides, 36 patients (37.5 %) had left side, 41 (42.7%) patients had right side pathology Cell Tumor, Chronic Hydrocele, Cyst. Hematoma, Hemiscrotum, Hernia. Large Cyst, Mass, Oedema, Scroto-lith, Spermatocele, Testicular Neoplasms, Solid Hypoechoic Mass, Epidydmo-orchitis were show 1%, frequency distribution of Calcification, Cystic Leison, Microlithiasis, Testicular Atrophy Were show 2%, frequency distribution of Epididymitis show frequency distribution was 3, frequency distribution of Abscess, Testicular Torsion 4, hematocele was 5, orchitis was 7, undescended testis was 8, varicocele was 10 and hydrocele was 31 and normal was 2.

Conclusion: Scrotal sonography is a high resolution, readily available and non-ionizing imaging modality for the differential diagnosis of scrotal pathologies. The addition of Doppler further characterize the pathologies that include but not limited to testicular torsion, varicocele and orchitis.

Keywords: Scrotal Ultrasound, Hydrocele, Varicocele.

INTRODUCTION

Ultrasonography (US) with the addition of pulsed as well as color doppler is imaging modality of choice to evaluate acute and non-acute scrotal pathologies[1]. Transportability, safety, low cost and efficacy, together with the ability to clearly define pathology quickly, have made ultrasound the primary imaging modality for assessment of the scrotum, testis and paratesticular structures[2]. The normal testes are homogeneous oval-shaped structures with medium reflectivity on B-Mode ultrasound, their size varying with age and stage of sexual development. In the adult male, they measure about 4 cm 3 cm 2.5cm[3]. It can help to diagnose a variety of indications like scrotal pain or trauma, sterility and abnormal outcomes on physical exam[4]. Scrotal ultrasound precisely determines the location and nature of palpable lesions and reveals non palpable scrotal masses. It has a high sensitivity in the finding of intra-scrotal irregularities[5].

Both testicles lie within the scrotum, a fibro-muscular sac divided into the right and left hemi-scrotum by a midline septum (raphe)[6]. The normal male testicle is an ovoid structure measuring approximately 5×3×2 cm (length × height × width) with a homogeneous, intermediate echogenicity (Fig. 1)[7]. The epididymis is a comma-shaped, elongated structure located at the posterior border of the testicle and is divided into the head, tail, and body[8].

The epididymal head overhangs the superior pole of the testicle and is isoechoic or slightly hyperechoic to the adjacent testicular tissue[9]. The epididymal body and tail are located behind and along the inferior pole of the testicle and are usually isoechoic to the testis[10].

Ultrasonography (US) is performed with a high-frequency transducer and doppler modes is the imaging modality of choice for evaluating acute and non-acute scrotal disease[11]. Many of these diseases including testicular torsion, epididymo orchitis, and intra-testicular tumor have common symptom like pain and differentiation of these disorders is important for determining the appropriate treatment. US with a high-frequency transducer helps to better characterize intra-scrotal lesions, and in many instances the findings suggest more specific diagnosis[12]. Preoperative ultrasonography is highly sensitive for distinguishing intra-testicular and extra-testicular lesions[13].

Clinical examination of scrotal pathologies is often inconclusive. It does not provide information whether a mass is solid or cystic, simple or complex and vascular or avascular. Testes are one of the most sensitive organs to ionizing radiation therefore x-rays are not commonly used for diagnosing testicular pathologies. Ultrasound is the modality of choice because it has high resolution for superficial structures including testes. Ultrasound can

determine whether a mass is solid or cystic, simple or complex and vascular or avascular.

Scrotal pain is a relatively frequent complaint confronting physicians in an emergency setting, and one that harbors potentially serious implications. Accurate diagnosis of testicular torsion and prevention of testicular infarction are of utmost concern in these patients.[13] Scrotal ultrasound is one of the main diagnostic tools for detection and monitoring of testicular abnormalities in boys.The aim of our study is to assess the importance of scrotal ultrasound imagning in diagnosis and management of different testicular pathologies.

METHOD AND MATERIALS

A descriptive study was conducted at Rahim Yar Khan Diagnostic Center. Data of 96 participants were designated done suitable sample method. SPSS version 21.0 was used for data analysis. Inclusion criteria all males with scrotal pain and sign and symptoms were included.

All other patients except mediastinal masses. Data was evaluated and analyzed with SPSS version 21, Microsoft Excel 2016. The quantitative data (gender) will be presented in the form of descriptive statistics, mean ±S.D, and qualitative data will be presented by percentage, frequency and bar charts or pie charts. Collected data will be stored in Microsoft Excel

RESULTS

Out of 96 patients, in which 74 patients (77.1%) had swelling, 22 patients (22.9%) had no swelling, 82 patients (85.4%) had trauma, 14 patients (14.6%) had no trauma, 88 patients (91.7%) had pain, 8 patients (8.3 %) had no pain, 19 patients (19.8%) had both sides, 36 patients (37.5%) had left side, 41 (42.7%) patients had right side pathology Cell Tumor, Chronic Hydrocele, Cyst. Hematoma, Hemiscrotum, Hernia. Large Cyst, Mass, Oedema, Scroto-lith, Spermatocele, Testicular Neoplasms, Solid Hypoechoic Mass, Epidydmo-orchitis were show 1%, frequency distribution of Calcification, Cystic Leison, Microlithiasis, Testicular Atrophy Were show 2%, frequency distribution of Epididymitis show frequency distribution was 3, frequency distribution of Abscess, Testicular Torsion 4, hematocele was 5, orchitis was 7, undescended testis was 8, varicocele was 10 and hydrocele was 31 and normal was 2.

Table 1 shows the result of frequency distribution of swelling. Total number of 96 patients, in which 74 patients (77.1%) had swelling, 22 patients (22.9%) had no swelling.

Table 2 shows the result of frequency distribution of trauma. Total number of 96 patients, in which 82 patients (85.4%) had trauma, 14 patients (14.6%) had no trauma.

Table 3 shows the result of frequency distribution of pain. Total number of 96 patients, in which 88 patients (91.7%) had pain, 8 patients (8.3%) had no pain.

Table 4 shows the result of frequency distribution of side of testes. Total number of 96 patients, in which 19 patients (19.8%) had both sides, 36 patients (37.5%) had left side, 41(42.7%) patients had right side.

Table 5 shows the frequency distribution of each pathology Cell Tumor, Chronic Hydrocele, Cyst. Hematoma, Hemiscrotum, Hernia. Large Cyst, Mass. Odema, Scroto-lith, Spermatocele, Testicular Neoplasms, Solid Hypoechoic Mass, Epidydmo-orchitis were show 1% , frequency distribution of Calcification , Cystic Leison, Microlithiasis, Testicular Atrophy Were show 2%, frequency distribution of Epididymitis show frequency distribution was 3 , frequency distribution of Abscess, Testicular Torsion 4, hematocele was 5, orchitis was 7, undescended testis was 8, varicoceles was 10 and hydrocele was 32 and normal was 2.

Table 1:

Swelling	Frequency	Percent
No	22	22.9
Yes	74	77.1
Total	96	100.0

Table 2

Trauma	Frequency	Percent
No	82	85.4
Yes	14	14.6
Total	96	100.0

Table 3

Pain	Frequency	Percent
No	8	8.3
Yes	88	91.7
Total	96	100.0

Table 4:

Slide	Frequency	Percent
Both	19	19.8
Left	36	37.5
Right	41	42.7
Total	96	100.0

Table 5:

Ultrasound Findings	Frequency	Percent
Abscess	6	6.3
Calcification	2	2.1
Cell Tumor	1	1.0
Chronic Hydrocele	1	1.0
Cyst	1	1.0
Cystic Lesion	3	3.1
Epididymitis	3	3.1
Epidydmoorchitis	1	1.0
Hematocele	5	5.2
Hematoma	1	1.0
Hemiscrotum	1	1.0
Hernia	1	1.0
Hydrocele	32	33.3
Microlithiasis	2	2.1
Orchitis	7	7.3
Scroto-lith	1	1.0
Solid Hypoechoic Mass	2	2.1
Spermatocele	1	1.0
Testicular Atrophy	2	2.1
Testicular Neoplasms	1	1.0
Testicular Torsion	4	4.2
Undescended testies	8	8.3
Varicocele	10	10.4
Total	96	100.0

DISCUSSION

Our study was designed to assess the importance of scrotal ultrasound imaging in diagnosis of different

testicular pathologies. For the purpose of diagnosis scrotal ultrasound is one of the main diagnostic tools for detection and monitoring of testicular abnormalities in males. A major indication is scrotal pain or abnormal clinical finding. Other indications include testicular torsion, testicular inflammation, hydrocele, varicocele.[14]In current study the attempt was made to determine the significance of scrotal ultrasound in patients with testicular pathologies. Data were collected according to variable of age, solid mass, cystic mass, hydrocele, varicocele, pyelocele, spermatocele, epididymitis and testicular torsion. Data of 96 patients were collected (100% males) from DHQ Rahim Yar Khan.

Arjhansari K, Vises N et al had performed a retrospective study in 72 cases of extra testicular lesions and 48 cases of intratesticular lesions to find out the causes of intra-scrotal disease in which it was reported that hydrocele was the most common pathology.[15] In our study of 70 patients, 68 patients (97.14%) had complaints of scrotal swelling, the most common cause being hydrocele. The second most common symptom was pain that was seen in 40 patients (57.1%). The most common cause of pain was infective/ inflammatory etiology 29(72.5%). Their study support our result in which. Total number of 96 patients, in which 74 patients (77.1%) had swelling, 22 patients (22.9%) had no swelling[15,16].

According to the results of our study out of 96 patient, 3 patients had enlarged epididmis and only 1 patients had epididymo-orchitis. Another study done by Horstman et al Chronic tubercular epididymo-orchitis was diagnosed in 3 patients. Heterogeneous echopattern with hyperechoic areas, enlarged epididymis and testis with increased vascularity were seen in all cases. Another similar study was done by Smith et al in which there were 10 patients (14.2%) diagnosed with acute epididymitis. USG features seen were enlarged epididymis in all the patients (100%), increased epididymal vascularity in 9 patients (90%) and altered echogenicity in 9 patients (90%). Other features such as reactive hydrocele and scrotal wall thickening further augment the diagnosis of epididymitis.[17]

Hydrocele was the most common lesion detected in our study accounting to about 33.3% of the total lesions which is comparable to the findings from many other studies, where the incidence of hydrocele has been reported to be about 21%.3,6 Hydrocele was most commonly seen in the age group of 31 to 40 years (n=6, 27.27%). In 8 patients it was seen on the right side (36.36%), in 7 patients on the left side (31.82%) and 7 patients had bilateral hydroceles (31.82%). hydrocele was 31(32%)[18].

Another study was reported by by Tinthyu M et al Varicocele was seen in eight patients. Seven had left varicocele (87.5%) and one had right varicocele. There were 4 patients with complaints of infertility, all of them with left varicocele[19]. Four patients (50%) belonged to the 21 to 30 years age group. USG features were dilated tortuous pampiniform plexus with reflux of blood on Valsalva manoeuvre. Among the subjects, 5 patients underwent surgery and there was a good correlation with USG and intra-operative findings. However post-operative improvement of patients with infertility could not be evaluated due to lack of follow up. Similar studies reported incidence of varicocele at 9.1%, 10.9% and 13.1%, by D'Andrea et al[12] and Rizvi et al3 respectively. All the three studies reported that 21 to 30 years as the most common age-group for varicoceles were support our result about varicoceles. varicoceles was 10(10.1%)[18]. Vijayraghavan S et al conducted a prospective study of 211 patients with acute scrotum and had concluded that the sonographic real time whirlpool sign is the most specific and sensitive sign of torsion, both complete and incompletem. Three patients (2.78%) had bilateral testicular microlithiasis[20]. The subjects belonged to the younger age group (10 to 30 years). No associated mass lesions were found in these patients. They were found as incidental lesions. In the pediatric population, Goede et al noted that the prevalence of testicular microlithasis was 2.4% in asymptomatic male patients belonging to the 0–19 years age group, with an increase in prevalence noted with increasing patient age. Our study show similar results as we find out microlithiasis is 2%[21].

CONCLUSION

Scrotal sonography is a high resolution, readily available and non-ionizing imaging modality for the differential diagnosis of scrotal pathologies. The addition of Doppler further characterize the pathologies that include but not limited to testicular torsion, varicocele and orchitis.

REFERENCES

1. Dogra VS, Gottlieb RH, Oka M, Rubens DJ. Sonography of the scrotum. Radiology 2003;227(1):18-36.
2. Wright S, Hoffmann B. Emergency ultrasound of acute scrotal pain. European Journal of Emergency Medicine 2015;22(1):2-9.
3. Hillelsohn JH, Chuang K-W, Goldenberg E, Gilbert BR. Spectral Doppler sonography: a noninvasive method for predicting dyspermia. Journal of Ultrasound in Medicine 2013;32(8):1427-32.
4. Adekanmi AJ, Adeniji-Sofoluwe AT, Obajimi G, Okafor E. A 10-Year review of ultrasonographic findings of scrotal diseases in Ibadan, South Western, Nigeria. African Journal of Medical and Health Sciences 2018;17(1):60.
5. Ragheb D, Higgins Jr JL. Ultrasonography of the scrotum: technique, anatomy, and pathologic entities. Journal of ultrasound in medicine 2002;21(2):171-85.
6. Kim B, Winter TC, Ryu J-a. Testicular microlithiasis: clinical significance and review of the literature. European radiology 2003;13(12):2567-76.
7. Blaivas M, Brannam L. Testicular ultrasound. Emergency Medicine Clinics 2004;22(3):723-48.
8. PIERIK FH, DOHLE GR, van MUISWINKEL JM, VREEBURG JT, WEBER RF. Is routine scrotal ultrasound advantageous in infertile men? The Journal of urology 1999;162(5):1618-20.
9. Metcalfe PD, Farivar-Mohseni H, Farhat W, McLORIE G, Khoury A, BÄGLI DJ. Pediatric testicular tumors: contemporary incidence and efficacy of testicular preserving surgery. The Journal of urology 2003;170(6):2412-6.
10. Eaton SH, Cendron MA, Estrada CR, Bauer SB, Borer JG, Cilento BG, et al. Intermittent testicular torsion: diagnostic features and management outcomes. The Journal of urology 2005;174(4 Part 2):1532-5.
11. Kaye JD, Shapiro EY, Levitt SB, Friedman SC, Gitlin J, Freyle J, Palmer LS. Parenchymal echo texture predicts testicular salvage after torsion: potential impact on the need for emergent exploration. The Journal of urology. 2008 Oct;180(4S):1733-6.

12. Kühn AL, Scortegagna E, Nowitzki KM, Kim YH. Ultrasonography of the scrotum in adults. Ultrasonography. 2016 Jul;35(3):180.
13. Thinyu S, Muttarak M. Role of ultrasonography in diagnosis of scrotal disorders: a review of 110 cases. Biomedical imaging and intervention journal. 2009 Jan;5(1).
14. Chan HN, Tan MJ, Wu H. Point-of-care testing: applications of 3D printing. Lab on a Chip. 2017;17(16):2713-39.
15. Ragheb D, Higgins Jr JL. Ultrasonography of the scrotum: technique, anatomy, and pathologic entities. Journal of ultrasound in medicine. 2002 Feb;21(2):171-85.
16. Peterson AC, Bauman JM, Light DE, Mcmann LP, Costabile RA. The prevalence of testicular microlithiasis in an asymptomatic population of men 18 to 35 years old. The Journal of urology. 2001 Dec;166(6):2061-4.
17. Kumar NL, Raghavendra AA, Nanjaraj CP, Shashikumar MR, Sanjay P, Nishanth RK. Evaluation of Spectrum of Scrotal Pathologies using High Resolution Ultrasound.
18. Khan MS, Humayoon MS, Al Manee MS. Epididymo- orchitis and Brucellosis. British journal of urology. 1989 Jan;63(1):87-9.
19. Seidensticker M. Drug Effects on the Excretory Ductal System of the Prostate, Seminal Vesicle and Epididymis (Doctoral dissertation, Monash University, Clayton, Australia).
20. Kumar NL, Raghavendra AA, Nanjaraj CP, Shashikumar MR, Sanjay P, Nishanth RK. Evaluation of Spectrum of Scrotal Pathologies using High Resolution Ultrasound.
21. Jha MK, Faizan A. Role of high resolution ultrasound and colour doppler in diagnosis and differentiation of scrotal pathologies. International Journal of Health and Clinical Research. 2020 Nov 8;3(3):133-8.