

Ultrasonography in Predicting the Cause of Scrotal Pain: A Study in Nepal

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Abstract Ultrasound is an easily available, less time consuming, reproducible and safest imaging modality in evaluation of scrotum. It is important to come to an accurate diagnosis in any case of scrotal pain. Although epididymitis with or without orchitis is commonly encountered, it is necessary to rule out emergency conditions like torsion of spermatic cord not only to salvage testes with timely surgery but also to avoid negative surgeries on otherwise inflammatory conditions. This study was done in Manipal Teaching Hospital situated in western region of Nepal on 100 cases presenting with scrotal pain. It was done over a period of 2 years from September 2013 to August 2015. Various causes of scrotal pain were accurately diagnosed in all the included cases. Prevalence of various common causes of scrotal pain were depicted by this study. Epididymitis was noted in 35% cases with scrotal pain, followed by varicocele in 15 % cases and epididymo-orchitis in 12 % cases. Most patients were in 20 to 30 years age group comprising 41 % followed by 31 to 40 years age group comprising 39%. Hence, scrotal USG is a valuable tool in diagnosing cause of scrotal pain more so in clinically equivocal cases.

Keywords: *ultrasonography, scrotal pain*

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1. Introduction

Ultrasonography because of its widespread availability, relatively low cost, no requirements for any specific preparations and absence of ionizing radiation or need for contrast materials, is frequently employed in the assessment of scrotal abnormalities. It is safest imaging modality to evaluate cause of scrotal pain. Technical advances in transducer design and image processing has further improved the quality of diagnosis of diseases of the scrotal contents, with colour Doppler adding important information. It is very important to confidently predict a surgical versus a nonsurgical cause of acute scrotal pain. Early surgery in torsion of spermatic cord helps to salvage testes [1] but must be cautious in avoiding unnecessary operations on large number of non surgical cases especially acute epididymitis [1,2,3]. Acute epididymitis is commonly the cause of acute scrotal pain in adults and hence should be differentiated from testicular torsion.

2. Aims & Objectives

To evaluate the role of ultrasonography in predicting different causes and their prevalence in patients presenting with scrotal pain to Manipal Teaching Hospital (Department of Radiodiagnosis and Imaging) along with their comparison with clinical findings, intraoperative

findings, clinical outcomes, follow up and/or pathological findings where available.

3. Materials and Methods

Hospital records (patient file sent to radiology department for USG) were reviewed to assess age, clinical presentation and clinical features including local and general examination and other relevant investigations. The study was carried out in Manipal teaching hospital for a period of two years, from September 2013 to August 2015. USG of scrotum was done using either Acuson X 300 or GE logic P3 USG machines. Maintaining privacy, scrotal sac was stabilized by placing a towel beneath the sac with the penis held against the abdominal wall by the patient. A high-frequency linear array probe (7-10 MHZ) with adequate transducer length (>5cm) was used, with colour and spectral Doppler capabilities. A view of both testes in the transverse direction allows comparison of testicular parenchyma features; important if a unilateral global testicular problem is suspected. The entire scrotal sac was examined in both the transverse and longitudinal planes. Additional views were also obtained asking patient to be upright and performing Valsalva maneuver when needed. The patient was asked to show the lesion and hold this between two fingers to be re-examined whenever first examination failed to find the lump. Detected lesions along with testes, epididymis and pampiniform plexus were also evaluated with color Doppler. All the USG

findings of scrotal USG and corresponding suspected clinical diagnosis and intraoperative findings and/or pathological findings and clinical outcomes on subsequent follow up scrotal USG were reviewed for all ages .

3.1. Inclusion Criteria

1. Patients presenting with scrotal pain
2. Consent given

3.2. Exclusion Criteria

1. Consent not given
2. Patients lost on follow up after initial USG

3.3. Ethical Clearance

Prior to the study, ethical approval from the institutional ethical committee was taken. Informed consent was taken from all the patients involved in the study and confidentiality was maintained.

3.4. Sample Size Calculation

In a study done by P K Chettri et al. [4] showed 40 % cases of scrotal pain had inflammatory cause, with 95% CI and 25% allowable error, sample size required was 96 [5].

4. Results

A total of 100 patients were examined on ultrasound for scrotal assessment. Age of the patient ranged from 11 to 70 years. As shown in Table 1, most patients were in range of 21 to 30 years comprising 41 out of 100 patients (41 %) closely followed by 31 to 40 years comprising 39 out of 100 patients (39 %).

Table 1. Age Distribution in Patients Presenting With Pain Scrotum

Age range(Years)	Number of cases	Percentage
11-20	2	2
21-30	41	41
31-40	39	39
41-50	9	9
51-60	7	7
61-70	2	2

Table 2. Different Causes of Scrotal Pain As Diagnosed By USG

USG diagnosis	Number of patients	Percentage
Epididymitis	35	35
Epididymo-orchitis	12	12
Epididymal cyst	9	9
Varicocele	15	15
Scrotal hematoma	6	6
Torsion	3	3
Malignancy	2	2
Testicular cyst	2	2
Scrotal edema	2	2
Spermatocele	2	2
Testicular microlithiasis	2	2
Ureteric calculus	2	2
Normal	8	8

Various causes of scrotal pain on ultrasound are depicted in Table 2. Epididymitis was the commonest diagnosis for scrotal pain comprising 35 out of total 100

patients (35%) followed by varicocele comprising 15 out of 100 patients(15%). Epididymo-orchitis remained another common cause of scrotal pain and was seen in 12 patients(12 %).



Figure 1. Gray Scale Longitudinal Scan of Scrotum Showing Heterogenous Echotexture of Epididymis and Testes in a Case of Epididymo-orchitis



Figure 2. USG showing heterogenous echotexture of epididymal head along with increased vascularity on color Doppler in a case of epididymitis



Figure 3. USG showing diffusely enlarged and heterogenous head and body of epididymis with increased vascularity on color Doppler in another case of epididymitis

5. Discussions

In this study, majority of the patients were in the age group of 20-30 years (41%) closely followed by age group

of 30 to 40 years (39%). This finding is similar to study done by P K Chettri et al [4]. In study done by Aubaid et al [6], 44 % of the patients were in 3rd and 4th decades.

In this study, epididymitis was the commonest cause of scrotal pain on ultrasound comprising 35% of the cases. Epididymo-orchitis was noted in 12 % of the cases and scrotal edema was seen in 2% cases. All these entities suggest inflammation. In epididymitis, epididymis is enlarged and appears hypoechoic with increased blood flow on color Doppler. Other common associated findings includes scrotal wall thickening and reactive hydrocele. The testis has normal echogenicity, echotexture and blood flow in isolated epididymitis, but many times this infection progresses to testes as well thus causing epididymo-orchitis. In such cases testes is also enlarged with affected areas appearing hypoechoic. Increased blood flow in testes is noted on color Doppler imaging. 2 % cases in our study showed scrotal edema. Thus overall, 49 % cases suggested inflammation. This finding is similar to study of P K Chettri et al [5] in which 40 % had inflammatory pathology. Similar study done by Arger PH et al [7] detected inflammatory pathology in 26 % cases where as Richie JP et al [8] showed only 25 % patients had inflammatory findings.

15 % cases in this study had varicocele with 13 cases (86.66%) having left sided varicocele and 2 cases (13.33%) having bilateral varicoceles. This finding is similar to study done by Minayoshi et al [9] which showed left side was affected in 78-93% of cases of varicocele. A varicocele is present in 15% of adult male patients [10], caused by incompetent valves in the internal spermatic vein. Impaired drainage is more evident when standing upright or during a Valsalva maneuver which renders the varicocele more prominent. Varicoceles are left sided in 78%, right sided in 6% and bilateral in 15%. This abnormal dilatation of veins arises more often on the left as a consequence of the angle at which the left testicular vein enters the left renal vein. The normal veins of the pampiniform plexus measure 0.5 to 1.5mm and a vein diameter of greater than 2mm should be considered abnormal [11]. On sonography, a varicocele consists of multiple low reflective serpiginous tubular structures of varying size, best seen superior and lateral to the testis. If large then varicocele may extend to the inferior aspect of the testis. Tumbling low-level echoes may be identified on real time imaging, secondary to low flow. Sonography in the supine and erect positions as well as following the Valsalva maneuver will help identify the varicocele and document retrograde filling. Examination of the left kidney is advocated in the presence of a varicocele to exclude a renal tumor in all patients by many clinicians, without much supporting evidence as to the prevalence of this association [12]. In a study carried out by Wolverson MK et al [13] Real-time sonography of the scrotal veins was done in 13 cases with clinically obvious or small varicocele and compared with findings in 10 normal controls. Vessels were 0.5-1.5 mm in caliber and a main draining vein up to 2 mm often was seen in normal cases whereas numerous dilated, tortuous, branching vessels of uniform size were observed in patients with varicoceles.

In the study, 9 % of cases had epididymal cyst, 2 % cases had cyst in testes and 2 % had spermatoceles. Cystic lesions of the epididymis include simple epididymal cyst and often spermatocele. Most epididymal cysts occur in

head of the epididymis but can occur in body as well as tail. Spermatoceles are bigger and multilocular in appearance and consist of cystic dilatation of tubules of efferent ductules comprising of low reflective debris representing spermatozoa, lymphocytes, cellular debris fat and proteinaceous fluid [14]. Epididymal cysts contain clear fluid and hence appear anechoic.

2 patients in this study showed heterogeneous appearance of testes with areas of necrosis. Post operative histopathological report confirmed seminoma. In adults, Seminoma is the commonest cause of cancer of the testis and is most commonly associated with cryptorchidism [15]. Most testicular tumors are of homogenous, low reflectivity in comparison to the surrounding testicular parenchyma, although a wide range of appearances occur including high reflective, heterogeneous lesions with areas of calcification and cystic change [16]. Larger tumors demonstrate increased vascularity [17], although with the newer high frequency transducers, malignant vascularity may be identified in small volume tumors [18,19].

3 cases in the study had testicular torsion which were confirmed on surgery. Testicular torsion is actually a spermatic cord torsion. It is a surgical emergency with need for immediate diagnosis and intervention to preserve testicle viability. Although history and clinical findings may be suggestive of the diagnosis, confirmation can be reliably confirmed only with color Doppler ultrasonography, which must be performed immediately [20].

Torsion causes swelling and edema of the testis, with decreased testicular perfusion. USG findings in early torsion can be those of a normal-appearing testicle. However, color and pulsed Doppler imaging shows absence of blood flow in the symptomatic testis. Epididymis may be enlarged along with hydrocele. With prolonged torsion, there is increase in size of the testes with heterogeneous echotexture. Late in torsion, hemorrhagic infarction occurs, and there are echogenic regions of hemorrhage mixed with the hypoechoic testicular parenchyma. USG has a very important role in differentiating torsion from other inflammatory causes as torsion is an acute emergency and needs timely intervention to salvage testes. WD Middleton and GL Melson [21] showed the findings on color Doppler sonography in five men with testicular ischemia (three having acute testicular torsion and two having testicular infarcts after herniorrhaphies). In all five cases, no intratesticular blood flow was seen on the symptomatic side, whereas normal blood flow was seen on the opposite side. In a study by BR Subramanyam, SC Horii and S Hilton, USG findings in 26 patients with diffuse testicular disease were retrospectively analyzed for features to differentiate diffuse neoplasms from diffuse orchitis or infarct. Diffuse neoplasms showed moderate to marked enlargement, globular shape, lobulated contour, and heterogeneous echotexture of the testis; the epididymis and scrotal skin were normal. In diffuse inflammatory disease, the testis was mild to moderately enlarged, the oval shape and smooth contour were preserved, and the texture was generally homogeneous; the epididymis was often enlarged, and scrotal skin was almost always thickened [22].

6 out of 100 cases in the study had scrotal hematomas. Trauma is one of the commonest cause of acute swelling of scrotum and scrotal pain. Fast diagnosis is very

important in testicular trauma, as it may result in hematoma, fracture, or rupture. The most frequent mechanisms include motor vehicle accidents, sports injuries, and straddle injuries. Often a pelvic fracture is also present. Physical examination and clinical diagnosis may be difficult due to edema and pain in the scrotum. Sonographic features include contour irregularity, hematoma, areas of altered echogenicity due to hemorrhage or infarction, poorly defined testicular outline, thickening of testicular or scrotal wall, and break in the tunica albuginea. These findings are not typical; however, when trauma history is present, surgical exploration is justified [23].

2 of the patients in the study had ureteric calculus as patient presented with pain in scrotum which was in fact radiating pain of ureteric colic. Ureteric calculi were seen on plain X-ray KUB and underwent Intravenous pyelography as well. 7 of the patients had no significant abnormality on scrotal ultrasound.

6. Conclusion

Ultrasound is safe, easily available, cheap imaging modality in evaluation of scrotal pain. It is both sensitive and specific in differentiating more common inflammatory conditions from acute emergency like testicular torsion which require immediate and timely surgery. Due to development of high frequency transducers and color Doppler facility, predicting the cause of scrotal pain is almost always possible.

Abbreviations

USG: Ultrasonography

MHZ: Megahertz

Declaration of Conflicting Interests

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