Ultrasonographic evaluation of scrotum using grey scale and doppler

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ABSTRACT
Objective: Ultrasound Grey scale in conjunction with color and spectral Doppler considered as the imaging modality of choice in scrotal disorders including scrotal masses, acute scrotal pain, and male infertility. To review the role of sonography in various scrotal conditions.

Materials and Method: A pictorial review of cases shows various scrotal disorders with typical sonographic features.

Results: Ultrasonography in addition with color and pulsed Doppler remains imaging modality of choice in the evaluation of scrotal disorders because of its simplicity, relative cheapness and quickness. Ultrasonography is more valuable in the evaluation of the acute scrotum to differentiate surgical emergency conditions like torsion. Recent technological advances in Ultrasonography particularly spatial and low-contrast resolution have improved the ability to detect and diagnose the scrotal conditions more accurately. This study reviews the use of grey scale Ultrasonography with color Doppler in the evaluation of acute scrotal pain, scrotal masses, male infertility, and trauma.

Conclusion: High resolution Ultrasonography in conjunction with Color Doppler gives high degree of accuracy in detecting, characterizing and better understanding of scrotal conditions. It still remains important undisputed modality of choice in acute scrotal conditions.

Keywords: ultrasound, doppler, scrotum

INTRODUCTION

B scale USG with addition of Doppler remains the modality of choice in assessing scrotal lesions. Scrotal lesions are divided and classified as testicular and extratesticular conditions. The common testicular lesions are vascular conditions like torsion, infection, neoplasms and inflammatory conditions. Extra testicular lesions include lesions of the spermatic cord, epididymis and scrotal wall. USG helps up to differentiate between lesions that require emergency surgery (torsion, and traumatic rupture) and those that can be managed conservatively (eg, epididymitis).

The main purpose of this study is to review the various scrotal conditions occurring commonly and uncommonly in routine clinical scenarios.

CLINICAL EXPERIENCE

This article is based on our experience with sonographic study of 100 individuals with scrotal conditions. The patients were aged 2 days to 60 years and were seen in the Department of Radiology at GMC Hospital, Ajman, UAE for last 7 months and few cases from AIIMS, New Delhi, INDIA from 2010 to 2012.

USG PROTOCOL

- High frequency probe- 7.5-10MHz.
- Linear or extended view probe can be used.
- Color and spectral Doppler.
- USG of inguinal and retroperitoneal areas

NORMAL SCROTAL ANATOMY AT US

- Scrotum consists of a very thin layer of skin (<3mm) and underlying fascia. Each hemiscrotum contains a testis with its coverings, epididymis, and spermatic cord\textsuperscript{1}. 
A normal testis measures 5 × 3 × 2 cm in size.

The testicular parenchyma consists of multiple lobules, each of which is composed of many seminiferous tubules that lead via the tubuli recti to dilated spaces, called the rete testis within the mediastinum\(^1\). (Figure 1)

**SCROTAL PATHOLOGY**

**Congenital anomalies:** Anomaly of testicular migration:
- Testicular ectopy, cryptorchidism, anorchidy and retractile testis are very common anomalies of testicular migration\(^2\) (Figure 2)
- Infertility and cancer are the two major risks of cryptorchidism.

Anomaly of closure of the processus vaginalis. Anomaly of closure of the processus vaginalis may result in a communicating hydrocele (a), hydroceles [Figure 3] (b), cyst of the cord (c), a congenital inguinal hernia (d) or congenital inguinoscrotal hernia

**Inflammatory Disease:**
- Primary epididymitis is generally caused by a bacterial infection. Orchitis is representing a direct extension of the inflammation. Isolated orchitis is unusual and generally is viral or posttraumatic.
- In acute epididymitis the typical sonographic features includes bulky enlarged epididymis with hypoechoogenicity and increased vascularity on Doppler. It may be focally or diffusely involved (Figure 4). On USG Orchitis shows focal or diffuse altered echogenicity with increased vascular flow on Doppler.
**Testicular torsion:**
It remains one of the important surgical emergency conditions\(^3\). Occlusion of the testicular artery causes necrosis of the testis after approximately 6 hours. Testicular torsion on USG shows variable findings depending on the degree of rotation and duration of torsion. In the early hours, the testis appears completely normal. After 4 hours, the testis is bulky enlarged with altered echogenicity predominantly hypo echoic. Presence of Doppler signal in testis in a patient with high clinical suspicion of testicular torsion does not exclude torsion (or incomplete torsion)\(^2,3\). (Figure 5).

![Figure 5: USG SCROTUM Shows Absent Vascularity in Left Testis](image)

**Vascular pathology:**
- **Varicocele** is a dilatation of veins of pampiniform plexus > 2-3 mm in diameter.
- The typical US findings in varicocele shows dilated tortuous anechoic tubular structures adjacent to the testis that expand with Valsalva manoeuvre and abdominal straining\(^2\).
- Color Doppler shows reflux of vascular flow in the spermatic vein, this increase with Valsalva maneuver.

**Testicular solid tumors:**
- Testicular cancers are relatively uncommon, common testicular tumors seen in younger age males\(^3\).
- **Seminomas** are usually well-defined, hypo echoic, solid ± lobulation. They don’t have calcification nor tunica invasion. On color Doppler seminomas usually demonstrate increased color flow.

**Testicular and epididymal cysts:**
- Simple epididymal cyst: Well-defined and anechoic cyst containing clear fluid, it may be seen throughout epididymis\(^4\).

**Scrotal calcifications:**
- Testicular microlithiasis (TM) corresponds to intratubular calcifications resulting from degenerating cells within the seminiferous tubules\(^4\).
- The characteristic USG appearance of microlithiasis includes multiple non shadowing echogenic foci measuring 2-3 mm and randomly scattered throughout the testicular parenchyma.
- Men with testicular microlithiasis must have regular US and tests for tumor markers.

**CONCLUSION**
- High-resolution B scale sonography in addition to color and spectral Doppler remains gold standard imaging modality and it is a choice of modality of imaging the scrotum in various conditions. Infact in most of the cases it is the first and foremost investigation because of its significant high sensitivity and specificity in detecting, characterizing and locating the scrotal lesions. It is considered as modality of choice in scrotal lesions in undisputed manner.
- USG is useful in the identification and diagnosis of various scrotal conditions like congenital disorders, infections, testicular torsion, and testicular neoplasms. And also extra testicular
conditions in addition to evaluation of male infertility.

REFERENCES

