Scrotal sonography in infancy and childhood updated

M. Mearadji
International Foundation for Pediatric Imaging Aid
Rotterdam, the Netherlands
www.ifpia.com
Introduction

- Sonography is the first choice for imaging the pediatric scrotum
- It is important to be familiar with normal anatomy of scrotum and the application of proper sonographic technique
- The patient history, and physical examination are both crucial to assure an accurate diagnosis
- Attention should be paid to age and anatomical variant by interpretation of different findings
Scrotal anatomy
Normal testicular volume in different pediatric ages

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<th>AGE</th>
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Normal sono-anatomy of testis
Classification of scrotal pathology

I. Abnormal size and number of testicals
II. Testicular adrenal rests
III. Acute scrotum:
   A. Testicular torsion
   B. Epididymitis
   C. Scrotal trauma
   D. Idiopathic scrotal wall edema
IV. Intrascrotal tumor
   A. Primary testicular tumor
   B. Secondary testicular tumor
   C. Paratesticular tumor
V. Hydrocele
VI. Varicocele
VII. Intrascrotal cysts
VIII. Microlithiasis of testis
IX. Vascular and lymphatic malformation
I. Abnormal size and number of testicles

Different sized testicles in a 12-year-old boy

Left-sided testicular atrophy after orchidopexy

2 cases of poly-orchidism
II. Testicular adrenal rests (5)

- Adrenal rests are associated with congenital adrenal hyperplasia (CAH), an autosomal recessive defect.
- The migration of adrenal cortical cells occur together with testis in utero.
- Sonographically adrenal rests appear as more or less round small hypo-echoic area intratesticular.

Testicular adrenal rest in a 15-year-old boy with CAH

Testicular adrenal rest in a 13.5-year-old boy with CAH
III. Acute scrotum

A. Testicular torsion:

- Reviewed patient material 22 children, 14 intravaginal torsion, 7 extra vaginal neonatal torsion, 1 testicular appendage torsion
- Sonographic features: enlargement and hypo-echogenicity of testicle after 4 to 6 hours, later on heterogenetic and mostly not more viable
- Color and power Doppler without testicular flow (sensitivity 19-100% specificity 100%)
- The sonographic appearance of testicular appendage torsion are similar to other types of torsion with variable echogenicity
Right-sided appendage torsion in a 13-year-old boy

Right-sided intravaginal torsion in a 13-year-old boy

Neonate with right-sided extra vaginal torsion

Congenital testicular torsion
III. Acute scrotum

B. Epididymitis:

- Reviewed cases 27 mostly in adolescence some with other genital urinary abnormalities, 4 cases additionally with scrotal edema. Only one case presented as chronic epididymitis.

- Sonographic feature: swelling of the epididymis, frequently hypo-echoic in some case hetero-echogenic. Frequently surrounded with reactive hydrocele.

- On color and power Doppler imaging mostly with increased epididymal flow.

Epididymitis in a 16-year-old boy
Left-sided familial mediterranean fever in a 8-year-old boy

Left-sided epididymitis in a 7-year-old boy
III. Acute scrotum

C. Scrotal trauma:

- Types of scrotal trauma are different including neonatal damage of scrotum by delivery, child abuse and in older children different types of accidental trauma. 6 cases were reviewed.

- Sonography appearances are changes of echogenicity due to hemorrhage and ischemia testicular ruptures surrounded with hematocele.
D. Idiopathic scrotal wall edema:

- Acute painful scrotal thickening without affection of testis or epididymis commonly occurs at the age of 4-7 years.
- Sonographic features include scrotal wall thickening with heterogenic straited appearance

Idiopathic scrotal edema in a 5-year-old boy
IV. Intrascrotal tumors

- Solid testicular neoplasms are rare in childhood
- Mature/immature teratomas and epidermoid cysts are benign and Yolk Sac tumors are malignant germ cell tumors
- Gonadal stromal tumors include Leydig and granulosa cell tumors classified as benign and Sertoli cell tumor as a malignant neoplasm
- Leukemia, lymphoma's and metastasis are rare secondary testicular tumors
  - Paratesticular rhabdomyosarcoma is the most common extratesticular tumor which tends to grow rapidly.
  - They usually involve the epididymis or spermatic cord.
- Sonographic appearance of most scrotal tumors are hypo-echogenic, in some conditions with heterogeneous texture with or without tumor calcification
Epidermoid cyst in a 17-year-old boy

Mature teratoma in a 2 months old boy

Immature teratoma in a 4 months old boy

Mature teratoma in a 3-year-old boy

Epidermoid cyst in a 17-year-old boy
Yolk Sac tumor in a 13-year old-boy

Yolk Sac tumor in a 4 months old boy
A case of Leydig cell tumor

Secondary testicle tumor

Granulosa cell tumor in a 7-year old boy

T-cell lymphatic infiltration of testis in a 7,5-year-old boy

A case of Leydig cell tumor

B-cell lymphatic infiltration in an 11-year-old boy
Paratesticular rhabdomyosarcoma in a 4-year-old boy

Paratesticular rhabdomyosarcoma in a 5-year-old boy
V. Fluid collection (hydrocele)

- Hydrocele is the most common cause of scrotal swelling in childhood (idiopathic).
- In neonates hydrocele is commonly associated with a patent processus vaginalis.
- 26 cases with hydrocele and 4 cases with hematocele were reviewed.
- Acquired hydrocele associated by:
  - testicular torsion
  - trauma
  - inflammatory process
- Hematocele associated by:
  - Trauma
  - After abdominal surgery
Communicated hydrocele

Non-communicated hydrocele

Hydrocele funiculi
VI. Scrotal varicocele (4)

- Mostly seen in adolescent and adult (10-15%)
- Frequently idiopathic and left sided
- Rarely acquired (large abdominal mass)
- Associated frequently with atrophic testis and infertility.
- Multiple hypoechoic serpingious, tubular structure on sonogram (2-7 mm), increases in size during valsalva maneuver.
- Doppler flow: dramatic augmentation of flow within the dilated veins with the valsalva maneuver
Varicocele

Varicocele in a 13,5-year-old boy

Varicocele and atrophy of the left testicle in a 13-year-old boy

Dilatation of plexus vein 3 minutes after standing position

Varicocele in a 14-year-old boy
VII. Epididymal cysts and spermatoceles

- Spermatocele is a cystic dilatation of efferent tubules of the epididymis.
- Occurs only after puberty
- Located near the upper pole of the testis or in the head of the epididymis.
- Sonographically the cysts are hypoechoic
- Septation are occasionally observed
- 7 cases reviewed
VII. Epididymal cysts and spermatoceles

Spermatocele in a 14-year-old boy

Spermatocele in a 12.5-year-old boy

Spermatocele in a 17-year-old boy

Spermatocele in an 11-year-old boy
VIII. Testicular calcifications (microlithiasis)

- Microlithiasis is defined as multiple calcifications smaller than 2 mm.
- Incidence is 1 : 600 in boys.
- Can be associated with syndromes or with undescended testes.
- Development of testicular tumors is discussed, but is not confirmed.
- Our reviewed patient material consist of 8 patients.
Microlithiasis of the testis in a boy with Prune Belly syndrome. Orchidopexy occurred in the past.

Microlithiasis in a 13-year-old boy.
IX. Vascular and lymphatic malformation (4)

- Vascular malformation and lymphangiomatosis are rare and may be confused with other scrotal masses
- Sonographic appearance of such abnormality depends on their anatomic structure
- Color Doppler is indicated to evaluate the vascularity of such scrotal changes

Cystic lymphangiomatosis in a 13-year-old boy.

Scrotal arteriovenous malformation in a 9-year-old boy

Vascular malformation in a 10-year-old boy.
Conclusion I

- Adequate equipment and sonoanatomic knowledge of the scrotum are needed in performing of scrotal sonography.

- A careful history and physical examination are imperative in work-up of a child presenting with an acute or nonacute scrotal pain or swelling.

- The most common causes of the acute scrotum in pediatric age are epididymitis and testicular torsion.

- A reactive hydrocele is a frequent finding in both epididymitis as well as testicular torsion.

- Color Doppler imaging is highly reliable to differentiate between testicular torsion and epididymitis both with nearly similar clinical signs.

- Paratesticular rhabdomyosarcoma are the most common non-germinal neoplasms affecting the scrotal content.