Radiodiagnosis

ULTRASOUND EVALUATION OF INGUINOSCROTAL AND INGUINOLABIAL SWELLING IN INFANTS.

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ABSTRACT

Objectives: Inguinoscrotal and inguinolabial swellings are common findings in children. In this study, doppler ultrasound was used to identify the various causes of inguinoscrotal and inguinolabial swelling, thus helping to decide on the timely and optimal management.

Patients and methods: 50 infants with a history of swelling in the inguinoscrotal or inguinolabial region were included in the study. All infants were subjected to ultrasound with doppler study.

RESULTS: Out of 45 male infants with inguinoscrotal swelling 40 were found to have chronic, 5 acute and Out of 5 female infants, 4 were found to have chronic and acute inguinolabial swelling.

Conclusion: ultrasound with color doppler study is an accurate, first line and effective diagnostic tool which can be used to identify the cause of inguinoscrotal and inguinolabial swelling in infants.

KEYWORDS : Pediatric; Scrotum; Hydrocele; Hernia; color Doppler Ultrasound.

INTRODUCTION

Most common cause of inguinoscrotal or inguinolabial swelling are Hernias and hydroceles. Male hydrocele, most commonly non-communicating hydrocele, accounts for 1–2% [1,2], while the reported incidence of inguinal hernia, most commonly indirect inguinal hernia, with a male-to-female ratio of 6:1 [3–7]. The incidence of inguinal hernia in premature infants has been reported to be about 5–30% with about two thirds being bilateral cases. Other causes of inguinoscrotal swelling include testicular torsion, undescended testis, retractile testis, epididymo-orchitis, inguinal lymphadenitis, paratesticular tumors and tumors of the inguinal region such as lipoma and liposarcoma. Causes of inguinolabial swelling include hydrocele of the canal of Nuck, hernias and inguinal lymphadenitis [9–11].

Ultrasound is an easily applied and highly accurate imaging modality. This study was carried out to assess the role of color Doppler ultrasonography in the identification of the different causes of inguinoscrotal and inguinolabial swelling, thus helping to decide on the optimal management.

PATIENTS AND METHODS

50 infants with a history of intermittent swelling or presenting with a palpable swelling in the inguinoscrotal or inguinolabial region were referred to the radiology department. Before referring them, the 45 boys and 5 girls aged between 1 day and 12 months (mean age: 3 months) were subjected to a complete clinical evaluation by an expert pediatrician. Only infants with a completed follow-up were included in the study. Those lost to follow-up were excluded. All the children were examined in supine position with a high frequency superficial ultrasound probe (ranging from 5 to 12 MHz) using the Samsung W80 ultrasound device (Medison, Korea) with color Doppler.

The examination was preferably done when the child's urinary bladder was empty and both inguinal regions were examined with the ultrasound in the sagittal and axial directions for solid and cystic lesion, detailed about hernia sac. The examination of children with a history of non-palpable inguinal swellings was easier when done while they were crying or by exerting gradual manual compression of the right and left iliac regions in order to increase intra-abdominal pressure.

The scrotal sacs were examined on both sides for the presence or absence of testes, any localized or diffuse fluid collections, the size and echo of the epididymis and testes, the thickness of the scrotal sac wall and any abnormal scrotal contents. Color Doppler evaluation of both testes and the epididymis was done to assess the vascularity.

In female children the labia majora on both sides were examined for the presence or absence of abnormal soft tissue or cystic swelling, and the contents of any cystic swelling were analyzed. According to the clinical presentation and ultrasound diagnosis, inguinolabial or inguinoscrotal swelling can be unilateral or bilateral, acute or chronic.

Acute swelling may present as a palpable tender swelling with

short duration history. Chronic swelling may be non-palpable at the time of examination, but it may also be intermittent or palpable without tenderness and is usually not associated with abdominal symptoms.

CAUSES OF CHRONIC INGUINOSCROTAL SWELLING

Depending on the etiology, chronic inguinoscrotal swellings may show the following features:

INGUINOSCROTAL HYDROCELE

Hydroceles are fluid collections between the layers of tunica vaginalis surrounding the testis or spermatic cord.

A **communicating hydrocele** is seen as an anechoic fluid collection encasing the testis and extending through the inguinal region to the internal inguinal ring due to complete patency of the processus vaginalis. Communicating hydrocele should be ruled out in every case of scrotal hydrocele.

A **non-communicating hydrocele** is seen as an anechoic fluid collection confined to the scrotal sac, encasing the testis from all sides except posteriorly. It does not expand to the inguinal region.

An **encysted hydrocele** of the spermatic cord is seen as an encysted fluid collection in the inguinal region with anechoic fluid inside due to obliteration of the processus vaginalis at its proximal and distal portions [13]. However, when the fluid is turbid and contains echogenic debris, this is suggestive of an encysted hematocele.

The **funicular type of hydrocele** is associated with a patent funicular process of the spermatic cord and appears as an anechoic localized inguinoscrotal fluid collection, extending from the site of the internal inguinal ring to the supratesticular region without encasing the testis [14].

FIG1. Schematic representation of various types of hydroceles.

INGUINOSCROTAL HERNIA

An **inguinal hernia** occurs when an intestinal loop or part of the omentum or genital organs passes into the scrotal sac through an incompletely obliterated processus vaginalis. It can be unilateral or bilateral, direct or indirect. It has been reported to occur with a male-to-female ratio of 6:1. The hernia sac may contain omentum, fluid or small intestine, in rare cases also the appendix or Meckel's diverticulum. The direct inguinal hernia is uncommon [16]. Ultrasonography should be done during straining unless the hernia sac is incarcerated.

FIG2.communicatinghydrocele **FIG3. encysted hydrocele of cord left.**

RETRACTILE TESTIS

Retractile testis caused by normal reflux commonly found during examination. During straining, the testis may be seen moving between the inguinal and the intrascrotal position. Sometimes mistaken for undescended testis.

UNDESCENDED TESTIS

The testis is located in the inguinal region and cannot move down to the scrotalsac during straining. An undescended testis located in the inguinal region may be wrongly diagnosed as an inguinal hernia.

FIG4.Funicular type of hydrocele of cord **FIG5.Noncommunicating hydrocele**

Features of acute inguinoscrotal swelling

acute inguinoscrotal swellings in male infants may show the following features.

INGUINAL LYMPHADENITIS

Inguinal lymphadenitis may be caused by perineal infection, infection of the ipsilateral limb or the gluteal region or as part of a generalized lymphadenopathy. On ultrasound, it appears as enlarged lymph nodes sized >1.5 cm in maximum diameter with a prominent medulla, a preserved or amputated central hilar echo and diffuse hypervascularity with a normal vascular branching pattern.

FIG6. undescended testis, midinguinal canal **FIG7.Right inguinal hernia bowel loops content.**

INTRASCROTAL TESTICULAR TORSION

The testis appears enlarged with diffuse hypoechoic texture, absence of intra-testicular vascularity, mild secondary hydrocele and an enlarged head of the epididymis with heterogeneous texture. Torsion of undescended testis. On color Doppler study an enlarged hypoechoic, non-vascularized testis is seen in the inguinal region.

EPIDIDYMO-ORCHITIS

Epididymo-orchitis is seen as an enlarged hypoechoic testis with diffuse or focal epididymal enlargement associated with diffuse hypervascularity and mild secondary hydrocele.

FIG8.Inguinal adenitis

Features of female inguinal swellings

Chronic inguinal swellings include the following disorders.

INGUINOLABIAL HERNIA

The hernia sac may contain an ovary, a tube and/or omentum

DIFFUSE HYDROCELE OF THE CANAL OF NUCK

In cases of diffuse hydrocele of the canal of Nuck, an inguinolabial anechoic fluid collection without herniation of the omental tissue, intestine or ovary is seen. It increases in size during straining.

ENCYSTED HYDROCELE OF THE CANAL OF NUCK

This disorder is seen as a localized or encysted fluid collection in the inguinal or labial region, not changing in size during straining

Acute inguinolabial swellings include the following disorders.

INGUINAL LYMPHADENITIS

Inguinal lymphadenitis in females shows the same features like in male inguinal lymphadenitis.

INCARCERATED HERNIA

Incarcerated hernia, when prolonged, may lead to strangulation. Strangulation involving the Fallopian tubes and ovaries is less common than strangulation of the hernia sac involving small intestine, with the latter being considered a surgical emergency

FIG9.hydrocele canal of nuck **FIG10.inguinal hernia ovary as a content.**

RESULTS

Inguinoscrotal swelling was ultrasonographically diagnosed in 45 male infants (Table 1). Of these, 40 were found to have chronic and 5 acute swelling.

Chronic swelling was caused by hydrocele in 12 cases: 2 cases with communicating hydrocele (Fig. 2), 3 with encysted hydrocele of the spermatic cord (Fig. 3), 3 with the funicular type of hydrocele (Fig. 4), 4 with noncommunicating hydrocele (Fig. 5) and . Hernia and undescended testes (Fig. 6 & Fig 7) were seen in 10 cases each, while retractile testes were found in 8 cases. Acute swelling included torsion of an intra-scrotal testis (1 case), torsion of an undescended testis (1 case), epididymo-orchitis (1 case), inguinal lymphadenitis 2 cases (Fig 8). Inguinolabial swelling was seen in 5 female infants. Chronic inguinolabial swelling was found in 4 cases, among these 3 cases with inguinolabial hernia and 1 case with encysted hydrocele of the canal of Nuck (Figs. 9 and 10). The other testis was ectopic in the contralateral inguinal region. Acute inguinolabial swelling was seen in 1 case inguinal lymphadenitis.

Table 1 results of study					
Male			Female		
Ultrasound Diagnosis	No of cases	%	Ultrasound Diagnosis	No of cases	%
CHRONIC					
Hydrocele	12	26.6	Hernia	3	60
Hernia	10	22.2	Hydrocele of canal nuck	1	20
Undescended testes	10	22.2			
Retractile testes	8	17.7			
ACUTE					
Inguinal Adenitis	2	4			
Torsion of intra scrotal testes	1	2.2	Lymphadenitis	1	20
Torsion of undescended testes	1	2.2			
Epididymo-orchitis					

DISCUSSION

Effective management of inguinoscrotal and inguinolabial swelling depends on an accurate diagnosis. However, in many cases, an accurate diagnosis cannot be achieved by clinical evaluation alone. Ultrasonography is an accurate, safe, inexpensive, readily available imaging modality that can help greatly to improve the diagnosis of inguinolabial and inguinoscrotal swelling. It can be used to differentiate between cases requiring surgical management and the time of surgical intervention can be determined based on the diagnosis

established with ultrasonography: urgent surgery without delay will be necessary in patients with testicular torsion or strangulated hernia, while surgery within 1 or 2 days will be applicable to irreducible hernia after a trial of reduction under sedation.

Cases with reducible inguinal hernia should be treated surgically as soon as possible, while surgery can be delayed in patients with communicating hydrocele or hydrocele of the canal of Nuck. In contrast to clinical evaluation, ultrasonography can easily differentiate between communicating hydrocele or hydrocele of the canal of Nuck and hernia in patients with chronic swelling. This is essential for determining the time of intervention since hernia requires faster intervention than communicating hydrocele. Ultrasonography can also differentiate between a retractile testis and hernia and, thus, deliver important information on the treatment necessary: a retractile testis only needs follow-up while hernia needs surgical repair. Also in patients with acute swelling, ultrasonography can be used to differentiate between cases requiring surgical management and those that can be treated conservatively or just need to be followed up. Clinical evaluation does not help in differentiating between epididymo-orchitis and testicular torsion.

Color duplex sonography, on the other hand, eases differentiation, with hypervascularity pointing to inflammation and absent vascularity to torsion. Inguinal lymphadenitis, torsion of an undescended testis and incarcerated hernia can also be easily differentiated using color Doppler ultrasound, while differentiation may be difficult when performing the clinical exam only. In cases with incarcerated hernia, ultrasound is a useful tool for evaluating the hernia contents, which is essential for deciding on the appropriate treatment. When the hernia sac contains small intestine, the risk of developing bowel ischemia is high and emergency surgery is required. Incarcerated hernia involving small intestine is more liable to strangulation than hernia involving ovaries, tubes or omentum, because the vascular supply of ovaries and tubes is not usually compromised. Ultrasound can be used for follow-up of the cases after medical and surgical treatment to assess the effectiveness of management and to exclude recurrence. However, ultrasound can be used to assess the necessity of such intervention. Ultrasonography is helpful in identifying a testis within the hernia sac and in confirming or excluding uterine agenesis [11,12].

CONCLUSION

Color Doppler ultrasonography is an accurate, safe and readily available imaging modality which can be used for the differentiation between different etiologies of inguinoscrotal and inguinolabial swelling in infants for the sake of reaching an optimum decision on proper management.

Conflict of interest: nil.

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