

Pediatric Scrotal Ultrasound for Detection of Infertility Etiology

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ABSTRACT

Purpose: The scrotum is an important organ in the reproductive system of male, as it comprises the testicle, which is in charge of manufacturing sperm for preservation of posterity of human being. Infertility has an apparent effect in most marital disputes. The main objective of this study is to detect scrotal diseases in children that may lead to infertility using ultrasonography.

Methods: The cross-sectional study was performed on one hundred and ten pediatric patients who were submitted to the ultrasound department for scrotal examination. Different ultrasound modes were used in this survey to evaluate the participant's scrotum along with taking medical history and final physical examination. Both outcomes were compared to assess the efficiency of ultrasound.

Results: Out of 110 patients, the majority of abnormal ultrasound findings were an infection, varicocele, and hydrocele (30 cases, 18 cases, and 12 cases) have respectively. 98.04% and 75% were values of ultrasound sensitivity and specificity, respectively in diagnosing scrotal pathologies.

Conclusion: At present, ultrasound offers high-quality services to assess the scrotum of children according to several aspects include safety, perfect, dependable, and economical investigative techniques. These characteristics have enabled ultrasound to be an effective method in evaluating most diseases in the human body, especially diseases of the scrotum.

Key words: Pediatrics, Scrotal diseases, Ultrasonography, Infertility

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INTRODUCTION

A human male has an external pouch that includes the important reproductive organs of men is known as scrotum [1]. It is considered the safe place for the testicles and is entrusted with providing the appropriate conditions for them [2]. The variety of the scrotum formation before birth made it a fertile environment for the development of various diseases [3]. Epididymo-orchitis is an inflammation condition of epididymis and testis, more common in boys over 6 years [4]. The defect of venous system of testicular led to condition called a varicocele, it mostly existed left side [5]. A hydrocele was gathering of liquid substance in scrotum around a testis, it usual finished without any Medical intervention [6-8].

Testicular torsion is an urgent situation occurs when testis turns around within its pouch, and prevents its particular blood supply [9]. The presence of the testicle in an uncommon location after birth, is an infrequent birth defect called a testicular ectopy [10]. When abdominal parts exist in the groin, then expansion inside the scrotum, this condition known as inguinal hernia [11]. Among urogenital system neoplasms in children the frequency of testicular ones is uncommon [12]. Before it issued Miskin and Bain their statement about dealing with sonography as a new examination method for the scrotum; the physical examination is the common [13]. Assessment of the scrotum carried out by using grayscale ultrasound combined with a method of Doppler [14]. Today ultrasound with different modes plays a great role in the detection of any diseases related to scrotum [15]. By using ultrasound scan with multiple a manifestations of scrotal diseases it aimed to get appropriate finding [16]. According to the decrease in the blood vessels of the testis in children is not easy to report the flux [17]. Due to vague features of scrotal diseases, its defiance, for the health care professional to detect it [18]. Some scrotal abnormalities consider causes of infertility if left without treatment such as varicocele, infection and testicular torsion [19].

MATERIALS AND METHODS

This a cross-sectional study carried out on 110 children age between 1 - 15 who were sent to the ultrasound departments at different Children hospitals in Khartoum state over a duration of 21 months from May 2020 to January 2021. The local ethics committee of hospital granted permission to conduct the survey. The inclusion criterion was children with an appearance of any scrotal diseases in the physical investigation. The exclusion criteria those who didn't agree to give consent. The participants underwent a general assessment, and their medical chart was reviewed. Ultrasonography performed using (ALOKA SSD-3500), apparatus with a high-frequency linear transducer (5-10 MHz). Examinations start with the child lay on his back; a series of images have taken in various views that cover scrotum, inguinal, and abdominal area if it's necessary [20]. The accuracy of the ultrasound was defined by matching of the final examinations results (Tables 1 and Table 2).

RESULTS

The population of the study consists of one hundred and ten subjects, the age extended from one year to fifteen years with an average age of 10.38 ± 3.20 years. The majority of cases found in the age group of 11-15 years (74 cases -67.3%), the least of cases were in the age group 0-5 years (11 cases-10%) Table 3.

The common finding of the study is an infection (26.36%)

Table 1: Data analysis was done by the following table.

Ultrasound Findings	Clinical assessment		Total
	Disease	Non-Diseased	
Positive	A(true +ve)	B (False +ve)	A+B
Negative	C (false -ve)	D (true -ve)	C+D
Total	A+C	B+D	A+B+C+D

Table 2: Sensitivity and specificity calculation methods.

Sensitivity	$A/A + C \times 100$
Specificity	$D/B + D \times 100$

Table 3: Age distribution of the study participants.

Age group (years)	Frequency	(%)
0-5	11	10
10-Jun	25	22.7
15-Nov	74	67.3

Table 4: Findings of ultrasound in the study participants.

Ultrasonography findings	Frequency	(%)
Normal	11	10
Infection	30	26.36
Varicocele	18	16.36
Hydrocele	12	11.82
Testicular torsion	8	7.27
Ectopic testicle	5	4.55
Inguinal hernia	6	5.45
Tumors	10	9.09
Other conditions	10	9.09

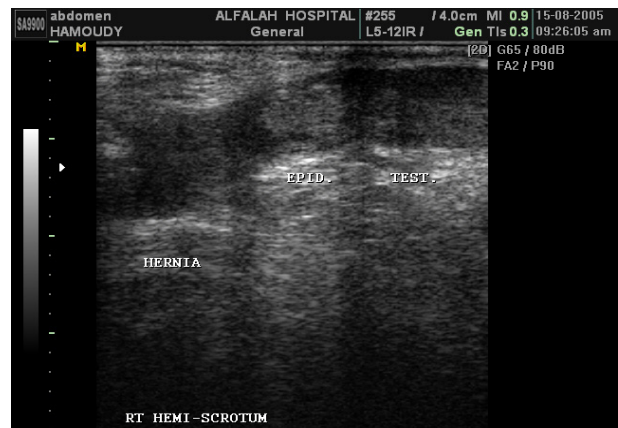


Figure 1: Sonogram of right scrotum show hernia (sagittal plane).

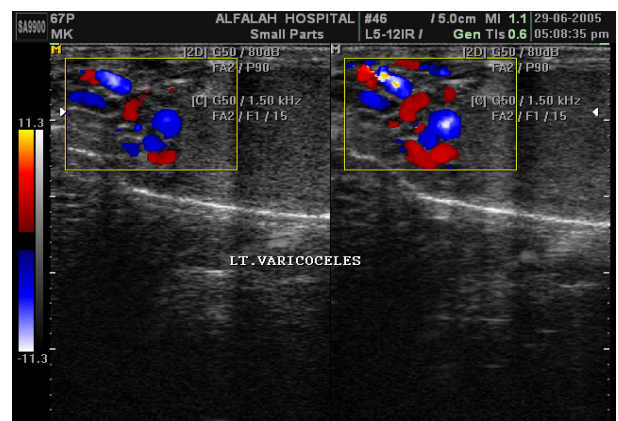


Figure 2: Ultrasound image demonstrate cyst in left testis (sagittal plane).

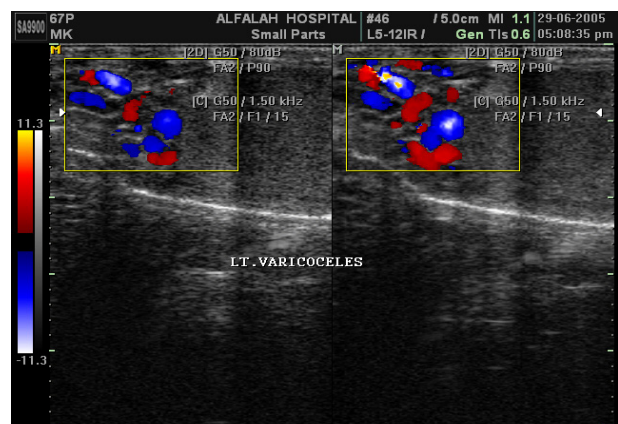


Figure 3: The color Doppler shows varicocele of left testis show.

Table 5: Findings of ultrasound and the final diagnosis.

Ultrasound Finding	Final Finding	
	Disease present	Disease absent
Disease present	100	2
Disease absent	2	6
Total	102	8

Sensitivity=98.04%, Specificity=75%

followed by varicocele(16.36%) then hydrocele (11.82%). The percentage of testicular torsion, tumors, Other conditions in this study were (7.27, 9.09 and, 9.09 respectively). An Inguinal hernia and ectopic testicle

represent the minimum occurrence (5.45%, 4.55% respectively). There were 11 children (10%) show a normal scrotum sonographic appearance (Table 4). Figures 1-3 showed the ultrasound findings.

Ultrasound was a perfect method for detecting scrotal abnormalities it illustrated extremely sensitive and specific (98.04% and 75% respectively). Another hand, it had a peaked positive and negative predictive rate (98.04% and 75% respectively) in Table 5.

DISCUSSION

According to their less risk, precision and uncomplicated ultrasound is the method of choice in assessment scrotal. In the present study, infection of the scrotum represents the highest percentage of 30 child patients (26.36%) out of 110 participants. This finding was supported by Rizvi et al. [18], which reported that most cases recorded by sonography were infection of the scrotum. And with Anderson et al. [21] who stated that the occurrence of epididymitis in children was 65% in study carried out in 2001. In contrast research done by Ibrahim [22] reported that before puberty, infection of scrotum was an infrequent. This current study revealed that the occurrence of varicocele and hydrocele among children was common; this result was matched to the finding of Tijani, et al. [23] and Tekgul et al. [24] in a study of Nigerian patients. And also, with the finding of previous studies, et al. [25] who stated that varicocele was widespread in age near puberty. This result was non-compliant with Simonsen et al. [26] and Pogorelić, et al. [27] who said that it related to age and most common in adulthood. In the current research, the percent of testicular torsion (TT) was slight low (7.27%). This outcome was in accord with Ashley et al. [28] who stated that TT was rare before puberty. Ectopic testicle demonstrated less frequency in this study 5 child out of 110 participants. This finding was matched with review performed by Hutson et al. [29] and Rahul et al. [30] who found that the occurrence of ectopic testicle about 1-4.5%. In this study the percentage of inguinal hernia was 5.45%. This finding was in agreement with Chow et al. [31] who found that this condition was more present in elderly people. The outcome of tumors in this study was 9.09%. This was compliant with Chung et al. [12] who stated that in Korea the prevalence of testicular tumors was uncommon in children under 4 years age. The increasing rate of scrotal diseases, One of the causes of male infertility [24]. Sensibility and precision of ultrasonography modality, Make it at the forefront of patterns of diagnosis of scrotum diseases.

CONCLUSION

Ultrasound becomes a suitable modality for evaluation of the scrotum due to its perfect, secure, low-cost, and reliable.

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CONFLICT OF INTEREST STATEMENT

There are no financial or other relations that could lead to a conflict of interest.

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