SCIENTIFIC ARTICLE

An evaluation of the role of ultrasonography in acute scrotum in children

R. Ranawaka, N.B. Wright, A. Goyal, A. Dickson, S. Hennayake, R. Cervellione.
Departments of Paediatric Surgery and Radiology, Royal Manchester Children's Hospital, Manchester, United Kingdom.

Key words: Torsion of testis in children, ultrasound scan of scrotum, scrotal exploration

Abstract

In children, due to difficulty in diagnosing torsion of testis (TT), a high rate of negative scrotal explorations is seen worldwide. To assess the possibility of utilising ultrasound scan of scrotum (USS-S) to minimise this rate at the Royal Manchester Children's hospital, a prospective audit of USS-S findings when diagnosis of TT became doubtful was performed.

Of the 61 children with acute scrotum admitted to emergency department (studied over 6 months), diagnosis was doubtful in 11 and hence had pre-operative USS-S: 7 urgent and 4 early. Twenty three underwent exploration without ultrasonography.

Of 7 early presenters, 3 were diagnosed as TT clinically, ultrasonically and at surgery.

One with clinically suspected but ultrasonically excluded TT had TT at exploration. Two clinically suspected torted appendages (TA) with sonographic finding of acute epididymoorchitis (AE) had AE at surgery. One with clinically doubtful diagnosis of TT/TA with USS-S finding of AE had TA at surgery.

In all 4 late presenters, TT was diagnosed clinically, ultrasonographically and at surgery.

USS-S was helpful in the diagnosis of early and late acute scrotum.

Introduction

Acute scrotal pain in children could represent a diagnostic dilemma due to difficulty in differentiating torsion of testis (TT) from torsion of appendage of testis (TA) and acute epididymo-orchitis (AE) as the typical clinical features of TT are seen only in 50% (1). Irreversible ischemic changes occur within 4 hours of onset of TT decreasing the testicular salvage rate after surgery from 90% at 6 hours to 10% at 24 hours (2). The threshold for surgical exploration has become low worldwide due to these facts resulting in 77%-86% negative scrotal explorations (3,4,5,6).

Correspondence: R.Ranawaka
E-mail: rravibindu@yahoo.com

Material and methods

A prospective audit of the use of ultrasound scan of scrotum (USS-S) in children admitting to the emergency department at The Royal Manchester Children's Hospital (RMCH) with doubtful diagnosis of TT was performed over a 6 month period (age range: from birth to 16 years).

USS-S was done urgently when the patient presented within 24 hours of onset of symptoms and, early after 24 hours of onset of symptoms. To minimise the workload on radiology department, surgery was done without USS-S when the clinical diagnosis of TT was highly likely. In every case, the clinical decision making was made by the consultant urologist or the registrar on call and the USS-S was performed by the consultant radiologist. The final management was based on the clinical findings irrespective of the USS-S results during the study period.

Patients were reviewed in the clinic at RMCH 6 months after being discharged to assess the status of the testis.

Data was collected prospectively by the first author who discussed with the decision making clinician and the consultant radiologist in each case. The audit proposal was approved by the Central Manchester Foundation Trust.

Results

The audit period was performed over a 6 month period (14/01/11-13/07/11). There were 61 patients.

Table 1: Analysis of patients who had urgent USS-S

Number	Clinical diagnosis	USS diagnosis	Surgical finding
3/7	TT	TT	TT
2/7	TA	AE	AE
1/7	TA/TT	AE	TA
1/7	TT	AE	TT

Eleven had clinically doubtful diagnosis of TT and were explored after USS-S. Seven of these had urgent USS-S. Four had non urgent USS-S. In all 4 patients, TT was diagnosed clinically, ultrasonically and at surgery.

Clinically TT was suspected and explored without USS-S in 23. In these patients there were 9 TT, 4 TA and 2 AE. Eight had normal testes.

Follow up

Clinic review was planned after 6 months but only 13/61 attended. Only 8 of these had undergone surgery. The rest had AE.

Only 1/8 had pre-operative USS-S. His TT was confirmed clinically, ultrasonically and surgically. On review, the testis was smaller than its partner. Of the 7/8 who underwent testicular exploration without USS-S, 5 had TT, 1 had TA, and 1had AE on exploration. On clinic review, all testes were of normal size.

Discussion

At a retrospective audit previously conducted at RMCH where 205 children with acute scrotum were studied over a 2 year period, out of 104 scrotal explorations TT was found in 15 and TA was found in 61 (7). On searching for a diagnostic aid to minimise the rate of negative scrotal explorations, ultrasound scan of scrotum (USS-S) with the sensitivity and specificity around 89-100% (8) was identified as the most practical and best imaging modality.

There were no guidelines at RMCH for using imaging in the diagnosis of acute scrotum prior to this audit. At a Urology-Radiology consensus session, criteria were decided upon to use USS-S when the clinical diagnosis of TT becomes difficult. The USS-S had to be limited to instances where the diagnosis of TT was doubtful in order not to overburden the workload of the radiology department. The study would have been more informative if USS-S was performed on all patients with acute scrotum.

During the study period patient management was done solely on the clinical findings to facilitate independent assessment by sonography. Later, the clinical and sonographic diagnoses were compared with surgical findings in each patient. On reviewing the images of the patients whose clinical, radiological and surgical findings disagreed, similar to other publications(5), we found that USS-S images were not always diagnostic (eg: when USS-S diagnosis was AE while clinical and surgical findings were TT, the USS-S did not show features of TT). The difficulties expressed by the radiologists included difficulty in differentiating TA from AE and performing sonogram in an already distressed child.

The following observations made on completion of the study.

USS-S was helpful in diagnosing both early and late acute scrotal presentations but can miss TT. Sonographical differentiation of early TA from early AE was difficult. In USS-S, TT was diagnosed on finding reduced or absent vascularity to the testis and AE was diagnosed on finding swollen enlarged epididymis (and possibly testis) with increased vascularity on doppler/colour flow. These findings were sometimes very subtle and therefore could have an element of operator dependency.

The experience of the decision making clinician might have influenced the negative outcome in some patients who underwent exploration without USS-S.

The value of the audit however, was limited by the poor long term follow up. The data obtained from this study is inadequate to arrive at a final conclusion on the use of

ultrasonography in the diagnosis of acute scrotum in children. The final decision on the surgery still needs to be based on the clinical findings. A multi centre study would provide better information as it involves higher number of patients over a shorter period of time.

References

1. Thomas DFM: The Acute Scrotum. In: Thomas DFM, Duffy PG, Rickwood AMK (eds): Essentials of Paediatric Urology. London: Informa Healthcare, 2008; 265-274

2. Visser AJ, Heyns CF. Testicular function after torsion of the spermatic cord. BJU International 2003; 92:200-203.

3. Kadish HA, Bolte RG. A retrospective review of pediatric patients with epididymitis, testicular torsion, and torsion of testicular appendages. Paediatrics 1998;102:73-76.

4. Mushtaq I, Fung M, Glasson MJ. Retrospective review of paediatric patients with acute scrotum. Auatralian and New Zealand Journal of Surgery 2003; 73:55-58

5. Ciftci AO, Senocak ME, Tanyel FC, Büyükpamukçu N. Clinical predictors for differential diagnosis of acute scrotum. European Journal of Pediatric Surgery 2004;14:333-338.

6.Karmazyn B, Steinberg R, Kornreich L, Freud E, Grozovski S, Schwarz M, Ziv N, Livne P. Clinical and sonographic criteria of acute scrotum in children: a retrospective study of 172 boys. Pediatr Radiol. 2005 Mar;35(3):302-10.

7. Thornton W A, Cerveillione M. Audit of children with potential acute scrotum presenting to Royal Manchester Children's Hospital between start of 2002 to end of 2003

8. Kalfa N, Veyrac C, Lopez M, Lopez C, Maurel A, et al. Multicenter assessment of ultrasound of the spermatic cord in children with acute scrotum. J Urol. 2007 Jan;177(1):297-301.