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The Role of Ultrasound in Detecting Renal Tract Abnormalities Following a Single Episode of Epididymitis

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Corresponding Author:	Nigel J. Hall, PhD University of Southampton Southampton, UNITED KINGDOM
First Author:	Jack Hassell, Southampton Children's Hospital
Order of Authors:	Jack Hassell, Southampton Children's Hospital Lara Kitteringham Nigel J. Hall, PhD
Abstract:	<p>Aim: The aim of the study was to establish the utility of ultrasound scan in detecting renal tract abnormalities following a single episode of epididymitis</p> <p>Methods: A single-centre retrospective review of all boys diagnosed with epididymitis between October 2012 and October 2017 including review of follow up imaging and clinical course was completed. Primary outcome was new diagnosis of renal tract abnormality by ultrasound.</p> <p>Main Results: Eighty-four boys with a first diagnosis of epididymitis were identified. Sixty-four cases (76%) were diagnosed at scrotal exploration, the remaining twenty clinically. Median age was 7.30 years (range 0.08-15.83 years), and five had a positive urine culture at presentation. Forty-eight boys (57%) had a follow-up ultrasound scan (at median 4.57 weeks (range 1-31 weeks)). Only two renal tract abnormalities were identified by ultrasound scan, both in boys aged <6 months, and neither was clinically relevant. Recurrent epididymitis occurred in 4 cases at median 26 days after initial presentation, of whom 3 had been followed up by ultrasound after initial presentation, all of which were normal. Further investigation revealed posterior urethral valves in 1 boy (age 6.5 months at initial presentation).</p> <p>Conclusion: Following a single episode of epididymitis, ultrasound was not helpful at detecting clinically relevant renal tract abnormalities, and furthermore did not identify the only patient with a clinically relevant abnormality. Based on these data, we propose follow-up imaging only in boys ≤ 6 months of age with a positive urine culture or a recurrent episode with consideration given to micturating cystogram even if ultrasound normal.</p>

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		<i>The number and practice type of all institutions where cases were performed</i>
		<i>The number of surgeons who actually operated in the study (& relative number of cases for each)</i>
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		<i>The range and median (not mean) for length of follow-up reporting</i>
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The Role of Ultrasound in Detecting Renal Tract Abnormalities

Following a Single Episode of Epididymitis

Jack Hassell^a

Lara Kitteringham^a,

Nigel J Hall^{a,b}

- a. Department of Paediatric Surgery and Urology, Southampton Children's Hospital,
Southampton, UK
- b. University Surgery Unit, Faculty of Medicine, University of Southampton, Southampton, UK

Corresponding Author:

Mr Nigel Hall

University Surgery Unit

Faculty of Medicine

University of Southampton

Southampton, UK

E-mail - N.Hall@uhs.nhs.uk

Telephone - 02381 206677

Aim

The aim of the study was to establish the utility of ultrasound scan in detecting renal tract abnormalities following a single episode of epididymitis.

Methods

A single-centre retrospective review of all boys diagnosed with epididymitis between October 2012 and October 2017 including review of follow up imaging and clinical course was completed. Primary outcome was new diagnosis of renal tract abnormality by ultrasound.

Main Results

Eighty-four boys with a first diagnosis of epididymitis were identified. Sixty-four cases (76%) were diagnosed at scrotal exploration, the remaining twenty clinically. Median age was 7.30 years (range 0.08–15.83 years), and five had a positive urine culture at presentation. Forty-eight boys (57%) had a follow-up ultrasound scan (at median 4.57 weeks [range 1–31 weeks]). Only two renal tract abnormalities were identified by ultrasound scan, both in boys aged <6 months, and neither was clinically relevant. Recurrent epididymitis occurred in 4 cases at median 26 days after initial presentation, of whom 3 had been followed up by ultrasound after initial presentation, all of which were normal. Further investigation revealed posterior urethral valves in 1 boy (age 6.5 months at initial presentation).

Conclusion

Following a single episode of epididymitis, ultrasound was not helpful at detecting clinically relevant renal tract abnormalities, and furthermore did not identify the only patient with a clinically relevant abnormality. Based on these data, we propose follow-up imaging only in boys \leq 6 months of age with a positive urine culture or a recurrent episode with consideration given to micturating cystogram even if ultrasound normal.

Keywords: Epididymitis; Ultrasound; Renal tract abnormality

Level of Evidence: IV

Highlights

- It is unclear whether ultrasound scan follow-up to identify renal tract abnormalities is necessary following a first episode of epididymitis in children.
- Our study shows that ultrasound scan following an episode of epididymitis is unnecessary, unless aged < 6 months, or with a positive urine culture, or an episode of recurrence

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Introduction

Epididymitis is a common differential diagnosis for a boy presenting with acute scrotal pain, along with testicular torsion and torsion of the testicular appendix [1]. Recent papers estimate epididymitis to be responsible for 3.7% - 43% of all presentations in boys with acute scrotal pain [1-5].

The precise aetiology of acute epididymitis in pre-pubertal boys remains unknown. In sexually active patients, sexually transmitted infections are well recognised as the most common causative organisms [6,7]. There are, however, several theories as to the aetiology of AE in the prepubertal boy. Theories include: retrograde spread of bacteria from the urinary tract [8], a post-viral phenomenon [9] and drugs (e.g. Amiodarone) [10].

Diagnosis is frequently made intra-operatively, during scrotal exploration since other differential diagnoses for the acute scrotum can often not be excluded via other means [4,5]. Management of acute epididymitis is variable, and is often influenced by urine culture, intra-operative swab culture, and clinician preference [11,12]. Due to a previously reported association with urinary tract abnormalities, patients frequently undergo an abdominal ultrasound scan following a presentation with acute epididymitis to exclude these [8,13,14].

Local experience suggested that detection of renal tract abnormality following a presentation with epididymitis may be unusual and therefore that renal tract ultrasound was unnecessary. Therefore this study sought to establish the utility of abdominal ultrasound scanning following a single episode of epididymitis.

Material and methods

A retrospective casenote review in a tertiary paediatric surgery centre was conducted of all boys presenting with epididymitis between October 2012 to October 2017. A diagnosis of epididymitis was made based on a combination of clinical features, bedside tests, laboratory results and intra-operative findings (where applicable). Cases were identified via a clinical coding search, using the International Classification of Disease 10 (ICD-10) code N45 - orchitis and epididymitis [15]. Data retrieved included clinical course, laboratory tests and radiology reports. Follow up clinic correspondence and re-presentations were also reviewed.

The study was approved within our institution as a service evaluation.

Statistical analysis was performed using SPSS software (IBM Corp. 2017, Version 25.0). Data are quoted as median(range).

Results

Eighty-four boys with a first diagnosis of epididymitis were identified. The majority, (n = 64, 76%) were diagnosed during scrotal exploration. 87% of the cohort aged <1 year underwent scrotal exploration, compared with 70% of the cohort aged 1 year or older. In the remainder (n=20) the diagnosis was made based on clinical features and urinalysis. Age at presentation was 7.3 (0.08–15.8) years. Just over one third of cases (n=30, 37%) presented at < 1 year of age, with 26% of the cohort aged < 6 months. Five boys (age 3 - 6 months) had a positive urine culture at time of presentation (*Escherichia Coli*, n= 4; Coliforms, n = 1).

Forty-eight boys (57%) had a follow-up ultrasound scan, at 4 (range 1–31) weeks). Only two renal tract abnormalities were identified by ultrasound scan - one uncomplicated duplex kidney and one dysplastic kidney (age at presentation 3 months and 6 months respectively). The child with the duplex kidney received no further follow up. The child with the dysplastic kidney was followed up by the paediatric urology team, underwent DMSA and micturating cystourethrogram investigations, but ultimately no intervention was required.

Of the 36 boys who did not have ultrasound after initial presentation just 1 had recurrent epididymitis.

Recurrent epididymitis occurred in 4 cases, at 26 (8 – 300) days, after initial presentation of whom 3 had been followed up by ultrasound after initial presentation, all of which were normal. One of these cases, aged 6.5 months at initial presentation, with positive urine culture (*Escherichia Coli*), re-presented aged 16 months. Micturating cystourethrogram was performed, which showed posterior urethral valves. In the remaining 4 boys who had a positive urine culture at initial presentation, all had a normal ultrasound with no abnormality detected and no recurrence.

In total, three renal tract abnormalities were identified, comprising 3.6% of this cohort. The most clinically significant of these (posterior urethral valves) was not detected on ultrasound and was the only renal tract abnormality detected that required operative intervention (1.2%).

Discussion

This study confirms that the majority of cases with epididymitis are diagnosed during scrotal exploration [4,5], as the first priority in the assessment of the acute scrotum remains to exclude testicular torsion. It also confirms that epididymitis is most common in infants, as previously reported [8,14].

Limitations of this study include that it was retrospective, which may have led to cases being missed and also likely accounts for only 57% of boys being followed up. Ultrasound follow up was performed largely based on consultant preference, and, as 57% of boys received ultrasound follow up, this could have led to some cases of renal tract pathology not being identified in the group without follow up. A further limitation is that scrotal explorations were largely carried out by junior surgeons, with no clear documented diagnostic criteria for epididymitis. Whilst this may have resulted in a different population of cases to previous reports we believe this unlikely since the diagnosis of epididymitis was made in a similar way across the majority of reports [8,13,14].

We have identified a significantly lower incidence of renal tract abnormalities than previously reported [8,13,14]. Cappèle et al [13] reported a series of 38 boys, of whom 18% had a renal tract abnormality, of which just one required operative intervention. They recommended further investigation only in those with recurrence, or a positive urine culture.

Siegel et al. [8] reported 47 patients, of which, 17% of all patients were found to have a renal tract abnormality, increasing to 47% of all pre-pubescent boys. These authors suggest a full urological evaluation, to include micturating cystourethrogram and intravenous pyelogram. Full urological evaluation for infants has also been recommended by a further study [14], reporting 25 cases, of which 44% had a renal tract abnormality.

In the most recent paper on this topic, Al-Taheini et al. [16] suggest a full radiologic workup to include a renal ultrasound and micturating cystourethrogram in children with acute epididymitis and a positive urine culture, or recurrent epididymitis. It is further suggested that a renal tract ultrasound is sufficient in those with acute epididymitis and negative urine culture.

There has previously been no consensus on the necessity of further imaging, or indeed the modality, following a single episode of epididymitis [17]. Our study is the largest performed to date, and identified no significant renal tract abnormalities on ultrasound scan following a single episode of epididymitis, regardless of age or positive urine culture. Furthermore, no abnormalities were found in

1 those aged greater than 6 months at presentation, or with a negative urine culture. In the only case
2 of a significant renal tract abnormality, ultrasound alone was insufficient.
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5 On the basis of these data, we propose the algorithm for investigation of boys following a first episode
6 of epididymitis shown in Figure 1. We propose that routine further imaging is only necessary in boys
7 ≤ 6 months of age, or with a positive urine culture or a recurrent episode, with consideration given to
8 micturating cystogram in those aged up to 1 yr, even if ultrasound normal.
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13 The most recent National Institute for Health and Care Excellence (NICE) guidelines for the
14 management of urinary tract infection (UTI) in children [18] suggest that a renal ultrasound is indicated
15 as follow up for all children under 6 months of age after a single urinary tract infection, if the child
16 responds to the initial infection within 48 hours. In atypical or recurrent UTI, NICE recommends a
17 DMSA or micturating cystourethrogram as further follow up. In those older than 6 months, ultrasound
18 is not recommended as an investigation unless there are recurrent episodes. Of note, NICE guidelines
19 do not currently include an episode of epididymitis as a urinary tract infection.
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28 The suggested algorithm above brings the follow up protocol similar to that recommended for UTIs by
29 NICE. The principal difference is not suggesting any follow up for those aged over 6 months.
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33 In conclusion, this study has shown a significantly lower incidence of renal tract abnormalities
34 following a presentation with epididymitis than suggested in previous literature. Following a single
35 episode of epididymitis, ultrasound was not helpful at detecting clinically relevant renal tract
36 abnormalities, and furthermore did not identify the only patient with a clinically relevant abnormality.
37 We have presented a new algorithm for the investigation of boys presenting with epididymitis.
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46 **References**

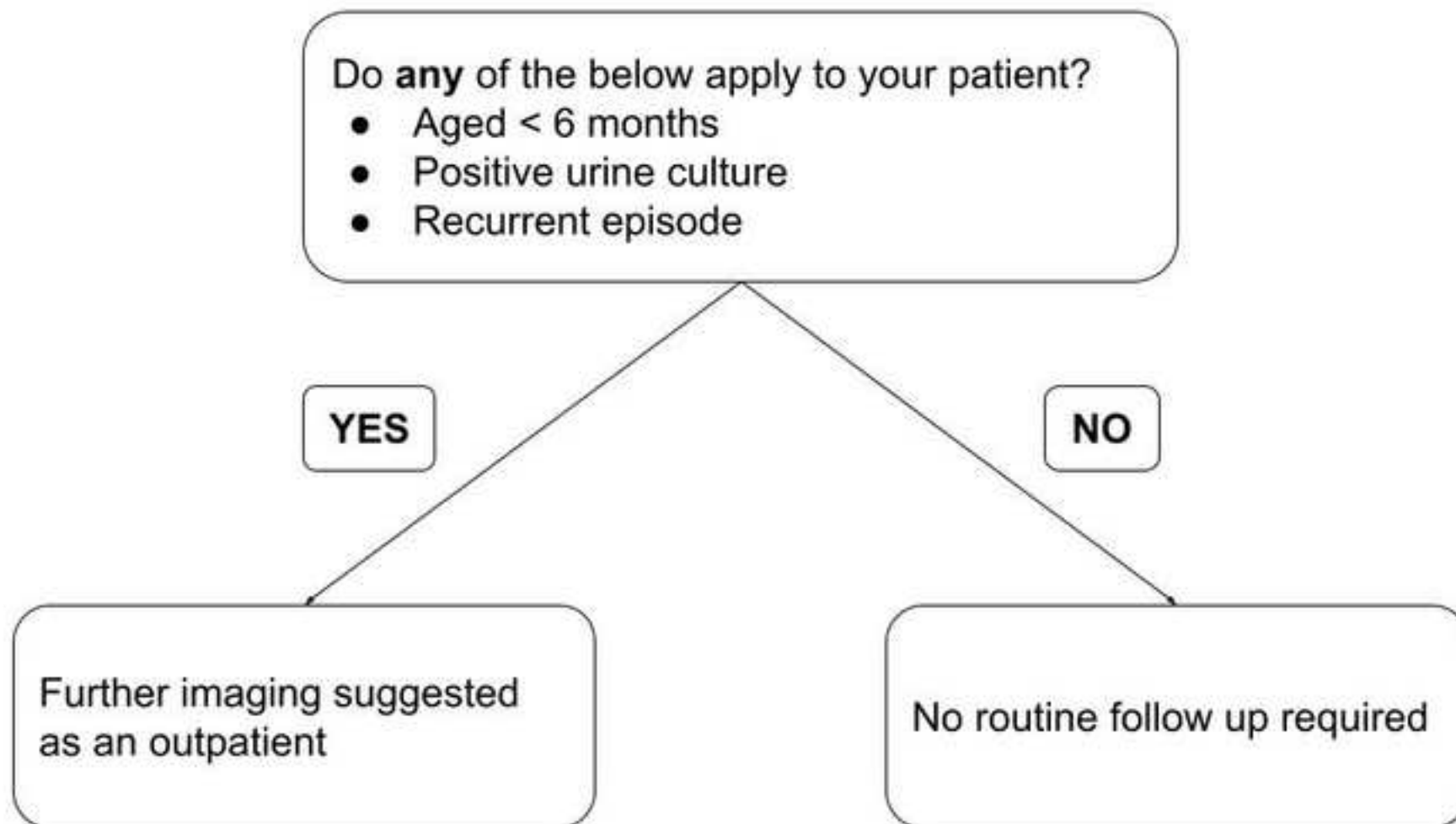
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Legend

Figure 1: Proposed management pathway for the follow up of an episode of epididymitis.

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