2016

Commissioning guide:

Management of Paediatric Torsion

Commissioned and facilitated by

East Midlands Clinical Networks

Sponsoring Organisations: British Association of Paediatric Surgeons, British Association of Paediatric Urologists
Date of evidence search: December 2015
Date of publication: October 2016
Date of Review: October 2019

Contents

1. Introduction

The acute scrotum is defined as sudden pain in the scrotum or its contents, often accompanied by local signs such as swelling, skin changes, and/ or systemic symptoms. In a boy presenting with an acute scrotum, it is imperative to rule out testicular torsion, which is a surgical emergency.

There is a bimodal distribution of testicular torsion with peaks in the first year of life and in early adolescence[1]. In 2013/2014, there were 3304 finished consultant episodes (FCE's) for Torsion of the testis, of which 2501 were in children (Health and Social Care Information Centre, November 2015).

Other causes of the acute scrotum are trauma, infection, hydrocoele, inguinal hernia, idiopathic scrotal oedema and systemic disease (e.g. Henoch-Schönlein purpura)[2-5]. Whilst there are features in the clinical assessment that may point to a specific diagnosis[6,7], suspicion of testicular torsion demands immediate surgical exploration[2 8-13]. The sequelae of non- operative management are well documented[14-18] and include testicular loss and possible impairment to fertility. Torsion has an annual incidence of approximately 3.8 per 100,000 males younger than 18 years[19,20] and accounts for approximately a third of acute paediatric scrotal disease[21]. Even with apparently successful testicular salvage, fertility can be impaired[18].

This is not intended as a guide for the clinical management of paediatric patients presenting with an acute scrotum. Neonatal Torsion is not included in this guide.

1.1 Diagnosis and Best Practice Referral Guidelines

Physical examination is unreliable in either confirming or excluding torsion of the testis. If there is suspicion of torsion, an immediate referral to secondary care is mandatory.

The classical clinical presentation of torsion is the sudden onset of severe, unilateral testicular pain, often accompanied by nausea and vomiting[6,7,21-23]. The pain may be intermittent but in established torsion it is often continuous. There may be a history of previous attacks of pain representing intermittent twisting/ untwisting of the testis. The physical examination should encompass the abdomen, inguinal region and scrotum, and a urine dip should be performed.

Clinical features depend upon the duration of the torsion, and may include localised swelling/ induration of the surrounding skin with erythema and tenderness. The testis may be high riding, the cord thickened by the twists or the epididymis may be located anteriorly.

Diagnosis of testicular torsion cannot be reliably excluded by location of pain, imaging, positive urine dip for infection, or presence of pyrexia. ***In many cases it is not possible to determine the cause of an acute scrotum without exploration based on history and physical examination alone***[1,2,7,9,10,19,22,24].

1.2 Secondary Care

Investigations

In patients with a history and physical examination suggestive of torsion, imaging studies should NOT be performed as they may delay treatment, therefore prolonging the ischaemic time. Negative surgical exploration is preferable to a missed diagnosis as all imaging studies have a false-negative rate.

The literature suggests a high degree of sensitivity and specificity can be attained with Doppler ultrasound[24-27]. Doppler ultrasound may nevertheless be falsely reassuring in the early phase of torsion and in partial or intermittent torsion: ***present arterial flow does not exclude testicular torsion***[28-30]. Imaging may be considered for a small number of children ***under the guidance of a senior clinician*** in late presenters or in those with atypical features.

Surgery

Considering the time- critical nature (NCEPOD Code 2- Urgent)[31] of the condition, patients and their families will benefit from assessment and surgery performed locally. ***The transfer of a boy with a suspicion of torsion from a Secondary Care Institution to a Tertiary Centre should therefore be an exceptional occurrence*** (e.g. medical comorbidities).

Children should receive surgery in a safe, appropriate environment. The evidence indicates that early surgery is crucial to prevent the development of permanent ischaemic changes after testicular torsion. The most important determinant of testicular salvage is the time between the onset of symptoms and surgical intervention[8,12]. Severe testicular atrophy can result after torsion for as little as 4 hours when the turn is greater than 360°[12].

During exploration, if torsion or the propensity towards it ('bell clapper testis') is encountered, fixation of the contralateral testis must also be performed. If the infarcted testis is unsalvageable it is removed. The possibly viable testis is untwisted, warmed and fixed.
Non absorbable suture material and 3 point fixation is commonly used[33].

2. High Value Care Pathway for paediatric torsion

2.1 Initial and Primary Care

- Examination of the testes should be performed in all male patients presenting with abdominal pain.
- Acute testicular pain, often with abdominal pain and sometimes vomiting has a high predictive value for testicular torsion. The patient should be kept fasted and a surgical referral should be made without delay.
- Where there is a suspicion of testicular tumour (preceding mass or chronic history >24 hours), urgent referral should be made to a tertiary paediatric surgical service for assessment.

2.2 Secondary and Tertiary Care

Global Requirements[32]

- ***Transfer of a boy with a suspicion of torsion from a Secondary Care Institution to a Tertiary Care Centre should be an exceptional occurrence*** (e.g. medical comorbidities).
- There should be local clinical guidelines for management and an agreed policy for treatment.
- Care should be provided within a clinical network of secondary/tertiary care providers.
- Triage and measurement of vital signs should be completed on arrival in an appropriate setting.
- The senior surgical decision maker should assess all children on admission to agree and action appropriate management with the on call consultant surgeon.
- There must be 24 hour access to a named Consultant Paediatrician.
- Appropriate radiology and laboratory facilities should be available.
- Children must be cared for in an appropriate environment[35].

- Trusts must ensure they have protocols and procedures in place to identify a deteriorating child and alert appropriately trained personnel.
- All staff who come into contact with children and young people are trained in safeguarding to an appropriate level as defined in the intercollegiate framework: *Safeguarding Children and Young people: roles and competences for health care staff*[34].
- Appropriate information in a range of formats and support must be available to parents/children to enable them to fully participate in decisions about the care of their child including fasting in case surgery is required.

Procedure Specific Requirements

- Surgery should be provided locally to avoid delays.
- Patient to be fasted at the earliest opportunity until assessed by surgical team.
- Immediate surgery should be performed if testicular torsion is suspected, and should not be delayed by imaging studies/ fasting status if the history and physical examination findings are strongly suggestive.
- Non-operative management of torsion of a testicular appendage (by evidence on clinical examination of a ‘blue dot’) should be made only by a senior surgical decision maker.
- Doppler ultrasound may be performed in equivocal cases on the direction of the senior surgical decision maker.
- When viable, fixation of the affected testes and the contralateral testes is required.
- A regular audit of processes and outcomes should be performed.

Follow up

- The patient should be followed up to assess the testis at around 6 months. Information should be provided regarding long term outcomes (including fertility, prosthesis insertion and development).
- Testicular prosthesis insertion should be discussed and offered after completion of puberty.
- Local psychology services should be available to children and parents if required.

3. Procedures explorer for paediatric torsion

Users can access further procedure information based on the data available in the quality dashboard to see how individual providers are performing against the indicators. This will enable

CCGs to start a conversation with providers who appear to be 'outliers' from the indicators of quality that have been selected.

The Procedures Explorer Tool is available via the Royal College of Surgeons website.

4. Quality dashboard for Paediatric Torsion

The quality dashboard provides an overview of activity commissioned by CCGs from the relevant pathways, and indicators of the quality of care provided by surgical units.

The quality dashboard is available via the Royal College of Surgeons website.

5. Levers for implementation

5.1 Audit and peer review measures

The following measures and standards are those expected. Evidence should be able to be made available to commissioners if requested.

Measure	Standard
Audit	Provider can demonstrate regular local audit for scrotal exploration outcomes, in reference to any national guidelines
Member of local GPS Network	Provider can demonstrate participation in the Network
Service Provision	Every provider should have a clear management policy for this condition in line with the commissioning guidance
Compliance with Network Audits	Involvement and provision of audit data to the Network
Appraisal	General paediatric surgery activity/ training should be included in annual appraisal and revalidation

5.2 Quality Specification/CQUIN

Commissioners may wish to include the following measures in the quality schedule with providers. Improvements could be included in a discussion about a local CQUIN.

Measure	Description	Data specification (if required)
Timely intervention	Percentage of explorations within 3 hours of decision to operate (NCEPOD 2) (excluding those with co-morbidities)	100%
Readmission rates	7 and 30 day readmissions	Quality Dashboard
Transfer (in exceptional circumstances)	Provider reports numbers and receiving unit Number of patients transferred for surgery Time between initial assessment (1st receiving unit) and surgery post transfer	
Patient Experience	Provider demonstrates collection and monitoring of parent/carer feedback	

6. Directory

6.1 Patient Information

Name	Publisher	Link
Information for parents	British Association of Paediatric Surgeons (BAPS)	http://www.baps.org.uk/parents/
Exploration for suspected torsion (adult information)	British Association of Urological Surgeons (BAUS)	http://www.baus.org.uk/_userfiles/pages/files/Patients/Leaflets/Torsion.pdf
Torsion of the testis	Patient.co.uk	http://patient.info/health/torsion-of-the-testis

Testicular lumps and swelling	NHS Choices	http://www.nhs.uk/conditions/Testicular-lumps-benign/Pages/Introduction.aspx
Counselling and mental Health	NHS England	http://www.nhs.uk/NHSEngland/AboutNHSservices/mental-health-services-explained/Pages/about-childrens-mental-health-services.aspx

6.2 Clinician information

Name	Publisher	Link
Standards for Children's Surgery - 2013	Children's Surgical Forum (RCSEng)	www.rcseng.ac.uk/publications/docs/standards-in-childrens-surgery
Surgery for Children: Delivering a First Class Service- 2011	Children's Surgical Forum (RCSEng)	www.rcseng.ac.uk/publications/docs/CSF.html
Guidance for Provision of Paediatric Anaesthesia	Royal College of Anaesthetists	http://www.rcoa.ac.uk/gpas2016
Management of pain in children	Royal College of Emergency Medicine	http://secure.rcem.ac.uk/code/document.asp?ID=4682
Standards for non-specialist emergency surgical care of children 2015	Children's Surgical Forum (RCSEng)	http://www.rcseng.ac.uk/surgeons/surgical-standards/working-practices/childrens-surgery/documents/standards-for-non-specialist-emergency-surgical-care-of-children.

7. Benefits and risks of implementing this guide

Consideration	Benefit	Risk
Patient outcome	Ensure universal access to best quality, timely and effective surgical management Reduce risk of testicular loss Protect long term fertility	Negative explorations
Patient safety	Patients have access to appropriate local surgical care where needed Reduce risk of complications Avoid late referrals	
Patient experience	Improve access to parent/carer information	Poor dissemination or uptake of pathway
Equity of access	Improve local access to effective procedures	
Resource impact	Reduce unnecessary referral and investigations Reduce claims/ complaints for loss of testis	Resource required to maintain and establish clinical networks

8. Further information

8.1 Research recommendations

- Does prompt scrotal exploration and fixation in less than 3 hours allow testicular salvage?

8.2 Other recommendations

- Establishment and maintenance of General Paediatric Surgery (GPS) clinical networks.
- Agreed national code for acute scrotal exploration and consistency in its use.

- Raising public awareness.
- Explore ways to quantify harm from delayed presentation, diagnosis and treatment.

8.3 Evidence base

1 Varga J, Zivkovic D, Grebeldinger S, Somer D. Acute scrotal pain in children--ten years' experience. *Urol Int* 2007; 78(1):73-7.

2 Makela E, Lahdes-Vasama T, Rajakorpi H, Wikstrom S. A 19-year review of paediatric patients with paediatric torsion. *Scand J Surg* 2007; 96(1):62-6.

3 Klin B, Lotan G, Efrati Y, Zlotkevich L, Strauss S. Acute idiopathic scrotal edema in children--revisited. *J Pediatr Surg* 2002; 37(8):1200-2.

4 Hara Y, Tajiri T, Matsuura K, Hasegawa A. Paediatric torsion caused by Henoch-Schonlein purpura. *Int J Urol* 2004; 11(7):578-80.

5 Kadish HA, Bolte RG. A retrospective review of pediatric patients with epididymitis, testicular torsion, and torsion of testicular appendages. *Pediatrics* 1998; 102(1 Pt 1):73-6.

6 Beni-Israel T, Goldman M, Bar Chaim S, Kozer E. Clinical predictors for testicular torsion as seen in the pediatric ED. *Am J Emerg Med* 2010;28(7):786-9.

7 Ciftci AO, Senocak ME, Tanyel FC, Buyukpamukcu N. Clinical predictors for differential diagnosis of paediatric torsion. *Eur J Pediatr Surg* 2004; 14(5):333-8.

8 Anderson JB, Williamson RC. The fate of the human testes following unilateral torsion of the spermatic cord. *Br.J.Urol.* 1986; 58(6):698-704.

9 McAndrew HF, Pemberton R, Kikiros CS, Gollow I. The incidence and investigation of acute scrotal problems in children. *Pediatr Surg Int* 2002; 18(5-6):435-7.

10 Murphy FL, Fletcher L, Pease P. Early scrotal exploration in all cases is the investigation and intervention of choice in the acute paediatric scrotum. *Pediatr Surg Int* 2006; 22(5):413-6.

11 Nour S, MacKinnon AE. Acute scrotal swelling in children. *J R Coll Surg Edinb* 1991; 36(6):392-4.

12 Sessions AE, Rabinowitz R, Hulbert WC, Goldstein MM, Mevorach RA. Testicular torsion: direction, degree, duration and disinformation. *J.Urol.* 2003; 169(2):663-65.

13 Skoglund RW, McRoberts JW, Ragde H. Torsion of the spermatic cord: a review of the literature and an analysis of 70 new cases. *J Urol* 1970; 104(4):604-7.

14 Bartsch G, Frank S, Marberger H, Mikuz G. Testicular torsion: late results with special regard to fertility and endocrine function. *J Urol* 1980; 124(3):375-8.

15 Krarup T. The testes after torsion. *Br J Urol* 1978; 50(1):43-6.

16 Thomas WE, Cooper MJ, Crane GA, Lee G, Williamson RC. Testicular exocrine malfunction after torsion. *Lancet* 1984; 2(8416):1357-60.

17 Romeo C, Impellizzeri P, Arrigo T, Antonuccio P, Valenzise M, Mirabelli S, et al. Late hormonal function after testicular torsion. *J.Pediatr.Surg*. 2010; 45(2):411-13.

18 Puri P, Barton D, O'Donnell B. Prepubertal testicular torsion: subsequent fertility. *J.Pediatr.Surg*. 1985; 20(6):598-601.

19 Huang WY, Chen YF, Chang HC, Yang TK, Hsieh JT, Huang KH. The incidence rate and characteristics in patients with testicular torsion: a nationwide, population-based study. *Acta Paediatr* 2013; 102(8):e363-7.

20 Zhao LC, Lautz TB, Meeks JJ, Maizels M. Pediatric testicular torsion epidemiology using a national database: incidence, risk of orchiectomy and possible measures toward improving the quality of care. *J Urol* 2011; 186(5):2009-13.

21 Caldamone AA, Valvo JR, Altebarmakian VK, Rabinowitz R. Acute scrotal swelling in children. *J Pediatr Surg* 1984; 19(5):581-4.

22 Boettcher M, Bergholz R, Krebs TF, Wenke K, Aronson DC. Clinical predictors of testicular torsion in children. *Urology* 2012; 79(3):670-4.

23 Vasdev N, Chadwick D, Thomas D. The acute pediatric scrotum: presentation, differential diagnosis and management. *Curr Urol* 2012; 6(2):57-61.

24 Boettcher M, Krebs T, Bergholz R, Wenke K, Aronson D, Reinshagen K. Clinical and sonographic features predict testicular torsion in children: a prospective study. *BJU Int* 2013; 112(8):1201-6.

25 Pepe P, Panella P, Pennisi M, Aragona F. Does color Doppler sonography improve the clinical assessment of patients with paediatric torsion? *Eur J Radiol* 2006; 60(1):120-4.

26 Nason GJ, Tareen F, McLoughlin D, McDowell D, Cianci F, Mortell A. Scrotal exploration for acute scrotal pain: a 10-year experience in two tertiary referral paediatric units. *Scand J Urol* 2013; 47(5):418-22.

27 Aso C, Enriquez G, Fite M, Toran N, Piro C, Piqueras J, et al. Gray-scale and color Doppler sonography of scrotal disorders in children: an update. *Radiographics* 2005; 25(5):1197-214.

28 Kalfa N, Veyrac C, Lopez M, Lopez C, Maurel A, Kaselas C, et al. Multicenter assessment of ultrasound of the spermatic cord in children with paediatric torsion. *J Urol* 2007; 177(1):297-301; discussion 01.

29 Karmazyn B, Steinberg R, Kornreich L, Freud E, Grozovski S, Schwarz M, et al. Clinical and sonographic criteria of paediatric torsion in children: a retrospective study of 172 boys. *Pediatr Radiol* 2005; 35(3):302-10.

30 Karmazyn B, Steinberg R, Livne P, Kornreich L, Grozovski S, Schwarz M, et al. Duplex sonographic findings in children with torsion of the testicular appendages: overlap with epididymitis and epididymoorchitis. *J Pediatr Surg* 2006; 41(3):500-4.

31 http://www.ncepod.org.uk/classification.html.

32 Children's Surgical Forum. Standards for non-specialist emergency surgical care in children. *Royal College of Surgeons*. 2015

33 Bolln C, Driver CP, Youngson GG. Operative management of testicular torsion: current practice within the UK and Ireland. *J Pediatr Urol* 2006; 2(3):190-3.

34 Safeguarding Children and Young people: roles and competences for health care staff. *Royal College of Paediatrics and Child Health*. 2014.

35 Intercollegiate Committee for Standards for Children and Young People in Emergency Care Settings. Standards for Children and Young People in Emergency Care Settings. *Royal College of Paediatrics and Child Health.*2012.

8.4 Guide development group

A commissioning guide development group was established to review and advise on the content of the commissioning guide. This group met twice, with additional interaction taking place via email.

Name	Job Title/Role	Affiliation
Mr Richard Bailey	Commissioner	Nene CCG
Nicole Barnes-Ogbata	Patient representative	
Mr Daniel Colliver	Chair Consultant Paediatric Surgeon	East Midlands General Paediatric Surgery Network Nottingham University Hospitals
Dr Yetunde Day	Anaesthetist	Royal College of Anaesthetists
Dr Emma Fernandez	Standards Manager	Royal College of Surgeons
Liz James	Nurse	Royal College of Nursing
Dr Suganthi Joachim	Consultant Anaesthetist	Royal College of Anaesthetists
Dr Puran Khandewal	Consultant Anaesthetist	Royal College of Anaesthetists
Dr Amit Maniyar	Radiologist	Royal College of Radiologists

Dr Paul Martin	Consultant Anaesthetist	Royal College of Anaesthetists
Mr Shaukut Memon	Consultant Urologist	British Association of Paediatric Urologists
Mr Sandeep Motiwale	Consultant Paediatric Surgeon	Royal College of Surgeons
Mr Feilim Murphy	Consultant Paediatric Urologist	British Association of Paediatric Urologists
Mr Anthony Owen	Consultant Paediatric Surgeon	Royal College of Surgeons
Miss Jane Patterson	Consultant General Surgeon	Royal College of Surgeons
Dr Damian Roland	Consultant in Paediatric Emergency Medicine	University Hospitals of Leicester NHS Trust
Dr Sarah Rushman	Consultant Anaesthetist	Royal College of Anaesthetists
Mr Manoj Shenoy	Consultant Paediatric Urologist	British Association of Paediatric Urologists
Dr Rajat Srivastava	GP	Royal College of General Practitioners
Mr Richard Stewart	Consultant Paediatric Surgeon	Royal College of Surgeons British Association of Paediatric Surgeons
Kate Taylor	Commissioner	Devon CCG
Sharon Verne	Senior Quality Improvement Manager	East Midlands Clinical Network
Mr Haradikar Varadaraj	Consultant Urologist	Royal College of Surgeons

8.5 Funding statement

The development of this commissioning guidance has been funded by the following sources:

- East Midlands Clinical Network funded the cost of the guideline development group, literature searches and contributed towards administrative costs
- The Royal College of Surgeons of England and the British Association of Paediatric Surgeons provided staff to support the guideline development

8.6 Conflict of interest statement

Individuals involved in the development and formal peer review of commissioning guides are asked to complete a conflict of interest declaration. It is noted that declaring a conflict of interest does not imply that the individual has been influenced by his or her secondary interest. It is intended to make interests (financial or otherwise) more transparent and to allow others to have knowledge of the interest.

The following interests were declared by group members: None