

STPN Acute Scrotum Management

Testicular Torsion is a challenging issue in children

The South Thames Paediatric Network (STPN) Surgery in Children working group has representatives from across the region from specialist children's surgery, general surgery, adult urology, paediatric and adult anaesthesia, paediatric nursing and commissioners. In 2020 the STPN working group proposed that children under the age of 5 years should be transferred to tertiary paediatric surgery/urology centres for management of acute scrotum. Children older than 5 years should be treated in their local centre. Children with complex needs or particular clinical challenges older than 5 years of age, that need transfer to tertiary centres, should still be transferred immediately.

Introduction

Testicular torsion occurs when the testes twists on its blood supply which in turn turns off the blood supply to the testis. When this occurs the survival of the testes is dependent on untwisting the testes and restoring the blood supply which requires an urgent surgical exploration. Testicular torsion affects 3.8 per 100,000 boys less than 18 years of age, each year.(1)

The acute scrotum is defined as a sudden and dramatic pain in the scrotum which can be associated with erythema, swelling, abdominal pain and vomiting. The most significant cause of an acute scrotum is testicular torsion which is a surgical emergency. Testicular torsion when treated rapidly has a significant testicular salvage rate. Prompt surgical detorsion can produce a salvage rate as high as 45-67% in the general population and 75-85% in paediatric population. Torsion occurs in children in two particular peaks; initially in the first year of life and then again in early adolescence.

In boys the presentation of an acute scrotum requires the clear delineation of the diagnosis and out ruling of testicular torsion. The key issues are early recognition of the problem by the parents or older child, early review by appropriate surgical services and prompt surgical intervention.

The STPN surgical network was formed partly in response to a perceived concern that significant numbers of children were being transferred from district general hospitals to tertiary centres both electively and as an emergency. Two of these conditions of concern for emergency transfer were children with appendicitis and testicular torsion. However the data shows that the vast majority of children have surgery for these conditions close to home in their local centre. This is to be applauded as there is no evidence that outcomes are better in paediatric surgical centres; it is easier for the child and family to have surgery in their local centre; avoids difficult and stressful transfers and has a shorter length of stay.

Thus there are two main choices for the network in the management of these children.

1. Centralisation of the services in the 4 tertiary centres with transfer of all boys with acute scrotum to these centres from the DGHs and exploration only occurring in the tertiary centres
2. Maintaining review and surgical exploration of these boys in their local centres whether they are in tertiary or district general centres.

The STPN acknowledges there are two options in this group.

Option 1.

All boys less than 16 years old are transferred to a paediatric surgical centre for urgent exploration.

Perceived benefits

- A. Review by experienced paediatric surgeon.
- B. Centralisation of cases in tertiary centres.
- C. No variability in outcomes between paediatric tertiary centre vs DGHS.
- D. Increased teaching opportunities in the tertiary centres.
- E. Potentially decreased scrotal explorations.

Option 2.

All boys less than 5 years old are transferred to a paediatric surgical centre for urgent assessment and exploration. Otherwise all boys less than 16 years old, but older than 5, with an acute scrotum should have their assessment and surgery performed in their local hospital (unless clinical or medical co-morbidities require transfer).

- A. Safer surgery closer to home
- B. Shorter time from onset to surgery
- C. Minimises transfer and ambulance usage
- D. Increased testicular salvage rate
- E. Decreased testicular exploration in non torsed testes in boys less than 5 years
- F. Better outcome for neonatal torsions as explored by neonatal surgeons in neonatal centres
- G. Maintains surgical and anaesthetics skills in the local centres
- H. Children with complex conditions treated in tertiary centres with associated extra support

Proposal

This is based on an understanding of the pathologies involved, a review of the commissioning guidance, an understanding of the literature and practical understanding of the regional logistics involved.

1. Understanding the Disease and Clinical management

History and examination of the acute scrotum can be extremely useful in determining the diagnosis. Classically the boy presents with severe onset scrotal pain which is unilateral in nature and severe. The pain can initially be intermittent in nature but can become continuous. Abdominal pain can occur along with nausea and vomiting. Useful clinical features consist of localised swelling, erythema

and acute tenderness over the testes and scrotal structures. The cremasteric reflex is usually not present on the affected side. The testis can sit high in the scrotum, can appear to sit transversely and the cord can be thickened. In reality it can be very difficult to determine the actual cause of an acute scrotum without exploration and there should be low threshold for rapid surgical intervention.

Radiological investigations can delay treatment and surgical intervention so in general it is not recommended. As the 2016 commissioning guide states clearly 'negative surgical exploration is preferable to the missed diagnosis as all imaging studies had a false negative rate'. Doppler scans have high sensitivity and specificity but are unhelpful in children less than year one of age.

As this is a time critical operation (NCEPOD code2 -urgent) the child will benefit from assessment and surgery being performed locally. Therefore the transfer of a child with a suspicion of torsion over the age of 5 years without medical comorbidities from a district general hospital to a tertiary unit should be an exceptional occurrence.

2. Why 5 years of age?

Testicular torsion under 5 years of age is known to be a rare event. The STPN Centres have reviewed their patient experience of all scrotal explorations within a paediatric surgical network of four centres serving a paediatric population of approximately 1.8 million. The only difference in the STPN recommendations and those of the NHS commissioning guide is the age of transfer.(2) The original guidance had no age limit and expected all DGHs to be able to explore children at any age. Due to the types of scrotal pathology seen in children less than 5 years, their low success salvage rate from true torsion and their higher incidence of negative exploration the STPN has taken a pragmatic approach and designated the age 5 years and above as the age when surgery should occur at the local centre and less than 5 year old boys should be transferred to an appropriate paediatric surgery/urology centre.

Commissioning guidance is very clear. Children should have access to early and prompt surgery in the first hospital that they attend. The key factor in salvaging testicular function is the length of time between the initial onset of symptoms and definitive surgery such scrotal exploration.(3) Although the time to testicular ischemia is as low as 4 hours or as high as 24 hours, prompt surgery less than 6 hours from onset of symptoms is viewed as critical.

In reality there are a huge number of age limits already in place across the STPN ranging from 0 in the specialist centres up to 11 years in certain DGHs, with numerous other age limits in between. This has occurred due to the fact that there is no national consensus on the lower age group for the treatment of these children. It has been proposed that the lower threshold match the age set by the Anaesthetic training CCT of 2 years. Due to the smaller number of cases between the ages of 2 and 5 years and the increased incidence of orchitis in that age group which can lead to unnecessary surgery the STPN surgery in children group decided the best option was to maintain the lower limit at 5 years.

3. Why Should Younger Boys go to the tertiary centres?

Torsion in the first year of life falls into two groups.

One is neonatal torsion which occurs either at birth or within the first 40 days. (4) Neonatal testicular torsion remains a challenging dilemma. The adult or verbal child is able to localize pain in a timely manner while clearly the neonate cannot. Neonatal torsion usually presents as a painless, hard scrotal swelling which may or may not have signs of acute inflammation. The hypothesis behind this is two-fold. Either the acute event was missed postnatally or the event occurred antenatally. This has led many authors to believe that neonatal torsion is essentially unsalvageable. A review showed that overall salvage rate is between 8.96% (all explorations) to 21.7% (stated emergency explorations). Even with the most aggressive management the success rate for salvage is low. (4)

The second group is older than 40 days and less than year. Torsion in this group is also complicated by the lack of a clear cause of pain, the extremely long delays in attending the primary centre and a low salvage rate in theatre.

Thus in the infant boys younger than one year of age the diagnosis of testicular torsion is very difficult even in expert hands; radiological investigations are even more limited and the overall salvage rate is extremely low.

Orchitis is the commonest cause of an acute scrotum in boys from the age of 1 year to 5 years. This can be unilateral or bilateral in nature with marked erythema and swelling with normal testis palpable within the scrotum

Other causes for the acute scrotum are well known. In older pre-adolescent boys the commonest cause of acute scrotum is a torticercal hydatid cyst, which is a small non-functioning structure which hangs from the testes and can twist. This causes acute, localised pain and an exquisitely tender blue spot on examination. In general it can be differentiated from testicular torsion on physical assessment but occasionally does require scrotal exploration.

4. The Argument for and Against Consolidation

In 2007 Tanner et al demonstrated that the volume of paediatric surgery occurring in a non-specialist centres was falling. (5) This trend has continued so that nearly 60% of operating occurs in the specialist trusts. However there is a clear division in the changes with the vast majority of the elective day case and in patient activity shifting to the tertiary centres while the majority of the emergency work is performed in the DGHs.

There is evidence that higher volume centres can have better outcomes. It is also reasonable to state that lower volume trusts will find it difficult to maintain the organisational skill, experience and competencies required to treat younger children.

By transferring all the patients they will be reviewed by more experienced staff with more exposure to paediatric scrotal pathology. This could reduce the need for intervention and thus an appropriate service in the district general hospital. There would be no difference in care between the management occurring for children who live locally to the tertiary centre and those who live further away or near other DGH sites. In theory, the increased cases in the major centres would allow more teaching for this condition and improve educational exposure and opportunities.

The risks of transferring all patients are equally important to define.

Clearly the current structures both from an educational perspective and the regional structures of care are flawed. The commonest model is an elective day case and outpatient service provided by the tertiary specialist centre to the DGH. In some situations there can be a visiting paediatric speciality surgeon and a local surgery both working on the same patient group with minimal interactions. In reality the local DGH surgeon / urologist has been excluded or disengaged from the elective paediatric surgery work leading them to limited elective exposure but a requirement to cover non elective emergency workloads. Reducing the elective and emergency work in DGHs will further reduce the exposure of staff to both paediatric anaesthesia and surgery.

There is presently huge variation in the STPN relating to the experience, governance and ability of individual trusts to provide the emergency service of scrotal exploration on a daily basis. The variation is due, in part, to reduced local elective exposure within the trusts and a lack of structure or framework which supports staff and enables local decision making. This leads to a loss in confidence and the requirement for the child to be transferred to the 'experts' in the tertiary centres. The lack of clarity and failure of acceptance of clear commissioning guidance has led to a chaotic system where emergency services in children may or may not exist in a non-specialist trust depending on the day of the week and staff available.

5. Minimising time to theatre.

The greatest impact on maintaining testicular function and viability during a torsion event is the time from torsion to surgical detorsion. Therefore there are two key periods.

Kumar et al demonstrated that the key issue for the safe salvage of a torqued testis was the length of time from symptoms to surgical exploration. The first is the time from the initial complaint of the child / parent noticing.

There is clear evidence that the duration of symptoms is one of the critical issues. The data about transfer and its affect is difficult. Transferred patients from district general hospitals have similar time to operate or time to treat as children admitted directly into the tertiary centre. This is due to the fact that the time is measured from the time of arrival into the operating trust. However these measurements are useful for evaluating the efficacy of treatment of a single centre and the patients' arrival within it but are unhelpful in looking at transfer times and overall duration of symptoms.

Morin et al demonstrated an 84% testicular salvage rate for patients attending the hospital with a short duration of symptoms as opposed to 15% if symptoms were greater than 24 hours. (6)

An excellent paper from Brazil examined 505 patients from 2012-2018 which revealed delays in diagnosis in the primary setting or the transferring units had a significant impact on the outcome. (7)

Testicular torsion is a common surgical emergency in children that requires a high index of suspicion, early diagnosis, and exploration. Most children present early to their GPs or local hospital. The risk of testicular loss is very high if there is delay in the initial diagnosis of testicular torsion. Greater effort in educating the primary health care professionals may reduce this delay. The primary objective of treating the acute scrotum should be prevention of testicular loss rather than treating symptoms.

Ryan et al looked at 140 hospitals and found that 33% of hospitals use inter-hospital transfer for paediatric torsions. While time to transfer was not found to be significant once again the keys issues

were the time lost from initial symptoms onset and presentation to medical review along with the time to surgery from the start of symptoms.

To be fair to adult surgeons there can be atypical symptoms such as abdominal pain in the prepubertal male which can be challenging and can lead to a delay in presentation and to a delay in diagnosis. The risk of orchiectomy has been found to decrease by 14-16% per 1-year increase in age. (9)

Plan for the future

Clearly there is a need for reducing the variation in the standard of care in these children between trusts.

No matter what the ICS decisions are, a number of recommendations are proposed to ensure quality care.

- A. There needs to be a formal, clearly defined pathway for the management of all children attending a non-specialist centre for all paediatric surgical emergencies.
- B. There needs to be agreed reporting to the ODN and the local ICSs. Presently there is an online audit tool developed by the STPN which each unit needs to complete to assess the clinical governance risk.
- C. A clear single transfer document should be in place to facilitate prompt transfer.
- D. A pragmatic future facing ODN led review of localised services and ensure plans are in place for training exposure for adult urologists, adult general surgeons and anaesthetic services to paediatrics both elective and emergencies.

Thus the STPN argues that maintaining emergency surgery in the DGH's is critically important. Scrotal exploration in boys older than 5 years of age in the DGHs should be normal practice. There needs to be a written protocol enabling the transfer of children into tertiary centres.

If centres are not able to provide this service then potentially other DGHs in the region should be commissioned to provide this service.

In summary STPN working propose that children under the age of 5 years should be transferred to tertiary paediatric surgery/urology centre for management of acute scrotum. Children older than 5 years should be treated in their local centre. Children with complex needs or particular clinical challenges older than 5 years of age, that need transfer to tertiary centres, should still be moved immediately.

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