



# Do not forget to include testicular torsion in differential diagnosis of lower acute abdominal pain in young males

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## KEYWORDS

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Abdominal pain;  
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torsion

**Abstract** *Background:* Management and outcomes of pediatric patients with testicular torsion initially presenting as acute abdominal pain were evaluated.

*Patients and methods:* The case records of 84 children operated on for testicular torsion from January 1999 through May 2012 were retrospectively reviewed. Of the total number of operated patients, 9 presented with abdominal pain but without initial scrotal pain, and only they were included in the study. The diagnosis of testicular torsion was made clinically and confirmed by Doppler ultrasound and scrotal exploration.

*Results:* The most common presenting symptoms were abdominal pain and vomiting. The patient's scrotum and testicles were not examined during the first evaluation in 6 cases, while in 3 cases the testicles were examined during the first physical examination. At surgery, 4 testes were salvaged, while 5 have been lost because of testicular necrosis. The mean duration of symptoms was 4 h in the group of salvaged testes and 39 h in the orchidectomy group. There were no major complications.

*Conclusion:* Testicular torsion should always be included in differential diagnosis when evaluating lower abdominal pain in young males. The external genital organs should be examined in every child or adolescent with acute abdominal pain.

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## Introduction

Testicular torsion is a true urologic emergency and must be differentiated from other complaints of testicular pain because a delay in diagnosis and management can lead to loss of the testicle [1–5]. Annual incidence of testicular torsion is 4.5 in 100,000 males 1–25 years of age [1]. It can occur at any age but usually occurs in young males, with a bimodal incidence in the pediatric population: during the first year of life, and between the ages of 13 and 16 years [2]. Testicular torsion occurs when the testis twists in the scrotum, cutting off its blood supply. This is an extremely painful condition and is the most common cause of a testicle loss [3–5]. As many as 50% of boys with testicular torsion have had a prior episode of testicular pain [6]. The left testis is more frequently involved. Bilateral cases account for 2% of all torsions [3]. It is a commonly held belief that a testicle torsed for longer than 6 h is outside the timeframe for survival [5]. If treated within 6 h of the presenting pain, there is a good chance of saving the affected testicle, as 90–100% testicles will be saved. If treated within 6–12 h 20–50% testicles will be saved and if treated within 12–24 h 0–10% testicles will be saved [1–3,5]. There are many conditions that can mimic testicular torsion. The differential diagnosis of an acute scrotum includes spermatic cord torsion, torsion of testicular appendage, acute epididymitis, trauma, incarcerated hernia, hydrocele, testicular tumors, and idiopathic and scrotal edema [1–4,7]. On examination, the patient with testicular torsion usually has a swollen tender testicle that is raised in a red scrotum and the testicle may be lying horizontally in the scrotum. Loss of the cremasteric reflex on the affected side and no pain relief when the testicle is elevated may also be noticed, and the patient may have a fever [1,4,5]. Not all testicular torsion cases present as acute onset severe scrotal pain. Some patients initially present only with lower abdominal or inguinal pain, and the pain moves to the scrotum a few hours later after the initial abdominal presentation. If this condition remains unrecognized, within the golden timeframe of 6 h after initial pain, the testicle may be lost. This is the reason why any male patient presenting with lower abdominal pain should have their testicles checked to make sure that they do not have torsion.

Since there are very few data on this topic in the current literature and these are mostly limited to case reports, the purpose of this study was to evaluate the management and outcomes of pediatric patients with testicular torsion initially presenting as acute abdominal pain.

## Patients and methods

The case records of 84 children operated on for testicular torsion in the Department of Pediatric Surgery, Split University Hospital Centre, from January 1999 through May 2012, were retrospectively reviewed. The medical records included initial medical history, physical examination, emergency ultrasound, operative findings, and the results of follow-up. The outcomes of all 84 patients were determined and those patients who presented only with abdominal pain were selected for further review. Out of

total number of operated patients, 9 patients presented with abdominal pain only, without initial scrotal pain.

A limitation of this study is possible information bias. Abdominal pain may have been present in more patients, but either that history was not elicited or not recorded. The results of our study were obtained from patient medical case records. Although the case records were written in detail, there is a possibility that there were more patients presenting with isolated abdominal pain.

The diagnosis of testicular torsion was made clinically and confirmed by a Doppler ultrasound and scrotal exploration. As Doppler ultrasound was used for diagnosis only during the last few years, the findings by this diagnostic method are not presented. Surgical exploration was performed on an emergency basis after analgesia administration and anesthesia preparation. An exploration of the involved hemiscrotum was performed through a horizontal incision. In all cases immediate detorsion of the testis was performed. If the testis remained vital after manual detorsion, fixation of the testis was performed. If the testis remained dark it was wrapped with warm saline-soaked towels for at least for 5 min. Subsequently, if no recovery in the color of the testicle was seen, the testicular capsule was incised. When no bright bleeding was detected, an orchidectomy was performed. All excised testicles were examined by a pathologist and diagnosis of testicular necrosis was confirmed. After a few weeks, application of a silicone prosthesis was performed in most of the patients.

The patients were followed up at 14 days, 3 and 12 months postoperatively, and then examined once a year.

## Results

In the selected study period a total number of 84 patients were operated on for testicular torsion. Mean age at the time of the surgery was 12.5 years (range 3 days–17 years). There was no significant difference in age between boys who presented only with abdominal pain and those who presented with testicular pain. Two peak incidences of testicular torsion were found: one during the first year of life, the other between 13 and 15 years of age. Mean duration of symptoms in the group of salvaged testes, at time of surgery, was 6 h (range 1–20), and in the group of orchidectomies it was 48.5 h (range 16–120 h). The left testis was affected in 48 cases (57%), while the right was affected in 36 cases (43%). Pain, absent cremasteric reflex and edema of hemiscrotum were the most common findings on physical examination (Table 1). Eight patients presented with inguinal canal testicular torsion [10]. In 29 patients (35%) an orchidectomy was performed because of testicular gangrene and 55 testes (65%) were salvaged. A Doppler ultrasound scan of the scrotum was performed immediately in most of the patients and in most cases showed an enlarged, avascular, affected testicle.

During the study period, of the total number of children operated for testicular torsion 17 patients (20%) presented with abdominal pain and nine of them (10.7%) presented with abdominal pain only, without initial scrotal pain. Only these nine patients were included in the study. Patient's characteristics and operative findings are presented in

**Table 1** Symptoms and signs in patients with testicular torsion ( $n = 84$ ).

Symptoms and signs	<i>n</i>	%
Pain, tenderness	72	86%
Absent cremasteric reflex	69	82%
Scrotal edema	68	81%
Horizontal lie of testis	52	62%
Scrotal erythema	44	52%
Hard testis	36	43%
Abdominal pain	17	20%
Nausea and vomiting	10	12%
Groin pain	6	7%
Temperature $>37.5^{\circ}\text{C}$	4	5%

**Table 2.** Mean follow-up was 72 months (range 3–122 months).

In the observed group of patients the most common presenting symptoms were abdominal pain ( $n = 9$ , 100%) and vomiting ( $n = 4$ , 44%), followed by groin pain ( $n = 3$ , 33%) and nausea ( $n = 1$ , 11%). In 5 cases abdominal pain was localized in the right lower quadrant, while left lower abdominal pain was present in 4 cases. Left testis was affected in 4 cases, while right was affected in 5 cases. The pain was ipsilateral to the torsed testicle (Table 2). The patient's scrotum and testicles were not examined during the first evaluation in 6 cases, while in 3 cases the testicles were examined during the first physical evaluation of the abdominal pain. In the group of patients whose testicles were not examined during evaluation of abdominal pain, the examination was performed most frequently by GP or ER physicians. In the group of patients whose testicles were examined during evaluation of abdominal pain, examination was in most cases performed by a pediatric surgeon or pediatrician (Table 2).

The mean duration of symptoms at time of surgery was 4 h (range 3–5 h) in the group of salvaged testes and 39 h (range 18–72 h) in the group of orchidectomies. At surgery, 4 testes were successfully salvaged, while 5 have been lost because of testicular necrosis at time of surgery. There were no major complications; only one wound infection was recorded.

At first visit, all patients with salvaged testis were pain free and reported no residual symptoms. Control Doppler signal confirmed vascularity in all patients. Follow up showed a good outcome in all the patients. In the group of salvaged testes there was no significant difference in size between the right and left testes. No testicular atrophy was recorded.

## Discussion

The differential diagnosis for a child with abdominal pain is extensive. It includes problems from organs within the abdomen as well as from organs outside of the abdomen. Testicular torsion can present with abdominal pain that mimics appendicitis or some other abdominal conditions, and can lead to significant morbidity if not quickly diagnosed [5]. As a result, it is important to always perform a

complete physical examination, including the genitals, when a child presents with abdominal pain [2,5,8,9]. Testicular torsion requires prompt diagnosis and intervention if the testicle is to be saved. Spermatogenesis may be lost within 4–6 h of absent blood flow [1–5]. Testicular torsion is the most common cause of testicular pain in boys older than 12 years, and is uncommon in boys younger than 10 years [1–5]. Testicular torsion usually presents with testicular pain and swelling, although it may present with abdominal pain. The pain usually begins abruptly and without a precipitating event. The pain may be accompanied by nausea and vomiting. The testicle is innervated by spinal segments Th 10 and Th 11, but the scrotum is supplied by L1 anteriorly and by S2 and S3 in its posterior part. Therefore, initial pain accompanying torsion in some cases is not felt in the scrotum at all; the extra scrotal pain can be observed to represent the anatomy of testicular innervation [9]. Physical examination will reveal swelling and erythema of the scrotal sac [1–5]. The testis will be in a horizontal rather than vertical position and the cremasteric reflex will almost always be absent. Torsion of an undescended testis will present as abdominal pain; examination of the genitals will reveal an empty scrotal sac [8,10]. Isolated abdominal pain is not pathognomonic for testicular torsion and also can occur in patients with epididymitis and torsion of the appendix testis [2,5].

Testicular torsion should always be considered by the emergency physician in the case of any male presenting with abdominal pain. Although torsion is most commonly seen at puberty, it can be seen at any age. The emergency physician must make this diagnosis quickly due to the risk of infarction and infertility. The goal of this study was to emphasize this condition because there are still many misdiagnosed cases.

In the literature there are only a few reports of isolated abdominal pain in patients with testicular torsion. Mellick reported a case of a 6-year-old boy who presented with acute abdominal pain. The patient's scrotum and testicles were not examined during the first evaluation, and later during a second examination, performed by a pediatric urologist, testicular tenderness and possible bruising were noted. At surgery the testicle was found to be torsed  $720^{\circ}$  and could not be salvaged [5]. Rathous et al. reported two cases of testicular torsion which presented as acute abdominal pain. In the first case incomplete torsion of the testis was misdiagnosed for acute appendicitis, and in the second case where abdominal symptomatology dominated the correct diagnosis of testicular torsion was made [11]. Corbett et al. reported two cases of testicular torsion presenting as acute abdominal pain. In both cases external genitalia were not examined, and at surgery the testicles were black and an orchidectomy was performed [8]. Anderson et al. reported that 22% of the patients in their series had abdominal pain, which often preceded and exceeded the scrotal pain, and 5% of the patients with testicular torsion and a fully descended testicle did not describe any scrotal pain. Inguinal pain alone was described in 6% of the cases. The appendix was removed in 3 patients before the true diagnosis was made [12]. Similar results were found in two other large series of patients [2,13]. The retrospective review by Mushtaq et al. reported abdominal pain associated with testicular pain and swelling in 28% of

**Table 2** Patients characteristics, operative findings and outcome in group of patients presenting with abdominal pain only ( $n = 9$ ).

Patient	Age	Side	Duration of symptoms at surgery (hours)	Presenting symptoms	Genital examination				Intraoperative findings	Degree of testicular torsion	Outcome	Follow-up (months)
					1st examination		2nd examination					
					Genital exam	Testicular torsion recognized/ not-recognized	Genital exam	Testicular torsion recognized/ not-recognized				
1	14	R	3	Abdominal pain, vomiting	Yes	Recognized (pediatrician)	—	—	Testicular torsion	720	Salvaged	122
2	13	R	5	Abdominal pain, groin pain	No	Not-recognized (ER physician)	Yes	Recognized (pediatric surgeon)	Testicular torsion in the inguinal canal	720	Salvaged	117
3	9	L	18	Abdominal pain, nausea, vomiting	No	Not-recognized (GP)	Yes	Recognized (pediatric surgeon)	Testicular gangrene	360	Orchidectomy	104
4	16	L	36	Abdominal pain	No	Not-recognized (GP)	Yes	Recognized (pediatrician)	Testicular gangrene	360	Orchidectomy	96
5	12	R	3	Abdominal pain, groin pain, vomiting	Yes	Recognized (pediatrician)	—	—	Testicular torsion	360	Salvaged	86
6	13	L	24	Abdominal pain	No	Not-recognized (resident of surgery)	Yes	Recognized (pediatric surgeon)	Testicular gangrene	360	Orchidectomy	56
7	16	R	48	Abdominal pain, groin pain, vomiting	No	Not-recognized (ER physician)	Yes	Recognized (pediatric surgeon)	Testicular gangrene	270	Orchidectomy	36
8	3	R	72	Abdominal pain	No	Not-recognized (pediatrician)	Yes	Recognized (pediatric surgeon)	Testicular gangrene	720	Orchidectomy	25
9	17	L	4	Abdominal pain	Yes	Recognized (GP)	—	—	Testicular torsion	360	Salvaged	3

the patients with testicular torsion, in 9% of the patients with torsion of testicular appendage and in 21% of the patients with acute epididymitis. They did not report how many patients with testicular torsion and a fully descended testicle did not describe any scrotal pain [14].

In our study, complaints of abdominal pain associated with testicular pain and swelling were made by 20% of the patients with testicular torsion, and 10.7% of the patients with testicular torsion and a fully descended testicle did not describe any scrotal pain. Testicular torsion in patients presenting only as acute abdominal pain most frequently was not recognized by GP and ER physicians because they did not perform examination of external genital organs. On the other hand, children and adolescents in some cases presented late to the pediatric surgeon for reasons of fear and shame. Very often they do not report testicle pain to their parents or to a doctor until the condition completely deteriorates. This is an additional reason why external genital organs have to be examined in every child or adolescent with acute abdominal pain. This is supported by the fact that in our study initial genital exam was not performed in 6/9 patients who presented with abdominal pain alone, and 5/6 orchiectomies occurred in the boys for whom a genital exam was not initially performed. Mellick in his excellent report stated that testicular torsion is the third most common cause of a malpractice lawsuit in adolescent males aged 12–17 years [5]. The misdiagnosis of testicular torsion is not a recent problem, an unavoidable event, or one owned primarily by emergency physicians. Perrotti et al. performed a review of claims and indemnity payments for urologists by an insurance company in New York State, and found that testicular torsion was tied as the fourth most commonly misdiagnosed condition [15]. Similar findings were reported in studies by Benson et al. and Stimson et al. [16,17]. Matteson et al. reviewed case files specifically involving testicular torsion of a large medical malpractice insurance company based in New Jersey. They found that the urologists were named most frequently and the most common misdiagnosis was epididymitis. Atypical presentations of testicular torsion were found in 31% of the cases [18].

## Conclusion

Considering the fact that abdominal pain can be the only presenting symptom of testicular torsion, any male patient presenting with lower abdominal pain should have their testicles checked to make sure that they do not have torsion. Bearing in mind this fact, if the patient comes in time, the testicle can be salvaged.

## Conflict of interest statement

Zenon Pogorelić and co-authors have no conflict of interest.

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