Factors Associated with Delayed Presentation and Misdiagnosis of Testicular Torsion: A Case-Control Study

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We identified factors associated with delay in presentation and misdiagnosis of testicular torsion. Compared with acute cases, delayed presentations were more likely to report isolated abdominal pain, developmental disorders, and history of recent genital trauma. Failure to perform a genitourinary examination or scrotal imaging was associated with misdiagnosis. *(J Pediatr 2017;186:200-4).*

Delay in treatment of testicular torsion is associated with a poor outcome.[1] Testis viability depends primarily on ischemia time. Reported orchiectomy rates increase dramatically when blood flow is not restored within 6 hours of symptom onset.[1,2] To date, research and quality care initiatives have focused on improving the accuracy of diagnosis and accelerating care pathways.[3,4] Although isolated surveys have examined patient and parental awareness of acute scrotal pathology unique to adolescence,[5-8] to our knowledge other factors associated with delay in presentation after onset of symptoms have not been reported. As the vast majority of delayed presentations of testicular torsion undergo orchiectomy, knowledge of factors affecting acute vs delayed presentation directly impacts testicular salvageability. In this study, we sought to identify symptom profiles and patient characteristics uniquely associated with delayed presentation and misdiagnosis of testicular torsion.

Methods

Data for this study were collected as post-hoc analysis of a previously published study on testicular torsion presentation patterns.[9] In extracting data for that study, we perceived patterns in symptoms, medical histories, and presenting characteristics among patients who presented with testicular torsion in the delayed vs acute setting. Those perceived patterns inspired this case-control comparison. Our overall goal was to identify areas for quality improvement initiatives at our institution and generate data for patient and parent education. Our institutional review board approved the study.

We reviewed cases of testicular torsion that underwent detorsion with fixation or orchiectomy between 2005 and 2015. Cases were identified using approved Current Procedural Terminology codes. We reviewed all elements of the electronic medical record, including emergency department (ED), transportation, consultation, and surgical documentation, for the identified encounter. Medical records preceding the identified encounter were reviewed to catch all cases of misdiagnosis. Presentations were considered acute (<24 hours) or delayed (≥24 hours) based on time from onset of symptoms to arrival at our ED. This classification was used as it was believed to be the most consistent across the various medical documentation. Cases were not separated as direct presentations to our ED or transfers from another facility as these classifications were not relevant to the study objective. We excluded cases of suspected intermittent torsion and patients under 2 years of age (to omit neonatal torsion and the inability to reliably communicate symptoms). Surgical pathology was reviewed in cases of orchiectomy to confirm nonviable testicular torsion as the underlying condition.

Our primary objective was to define factors associated with delayed presentation of testicular torsion. Cases of acute presentation were reviewed as controls. We extracted initial symptom profile and medical history. Symptom profile variables included those symptoms (ie, scrotal pain, abdominal pain, nausea, and vomiting), which patients reported when first noting deviation from their usual state of health. Medical history variables included the presence of developmental, cognitive, or social disorders and history of recent genital trauma. To abstract other factors potentially contributing to delay in presentation, we identified whether cases reported withholding symptoms from their parents or previously seeking medical help for similar complaints within 24 hours of symptom onset, suggesting misdiagnosis of testicular torsion.

As a secondary objective, we sought to define factors associated with misdiagnosis in the acute setting. We extracted details related to initial medical visit, searching our electronic records and scanned outside records to confirm documentation of a genitourinary (GU) examination and appropriate scrotal imaging (Doppler ultrasound or nuclear scintigraphy).

Baseline descriptive information and surgical outcome (detorsion with fixation or orchiectomy) were collected for all patients. Proportions were compared using Fisher exact test with 2-tailed *P* values of <.05 considered significant.

ED	Emergency department
GU	Genitourinary

Table I. Descriptive statistics, symptom profiles, and medical histories for acute vs delayed presentations of testicular torsion

	Acute presentations	Delayed presentations	P
Cohort descriptive statistics	n (% or SD; range)	n (% SD; range)	
Total patients	114 (54.8)	94 (45.2)	
Orchiectomy	28 (24.6)	84 (89.4)	<.0001
Mean age (y)	12.9 (3.4; 2-18)	12.6 (3.3; 2-19)	
Mean weight (kg)	59.2 (22; 13.2-142)	60.0 (23.7;11.4-169.5)	
Race	n (%)	n (%)	
African American	70 (61.4)	69 (73.4)	.08
Latino	20 (17.5)	7 (7.4)	.04
Caucasian	9 (7.9)	7 (7.4)	1.0
Asian	2 (1.8)	1 (1.1)	1.0
Other	13 (11.4)	10 (10.6)	1.0
Symptom profile	n (%)	n (%)	
Initial scrotal pain without abdominal pain	81 (71.1)	56 (59.6)	
Orchiectomy	19 (23.5)	53 (94.6)	.11
Initial abdominal pain without scrotal pain	0	19 (20.2)	
Orchiectomy	—	16 (84.2)	<.0001
Experienced nausea	67 (58.8)	45 (47.9)	
Orchiectomy	17 (25.4)	39 (86.7)	.13
Experienced vomiting	56 (49.1)	40 (42.5)	
Orchiectomy	14 (25)	36 (90)	.40
Patient and history characteristics	n (%)	n (%)	
Developmental, cognitive, or social disorder	3 (2.6)	10 (10.6)	
Orchiectomy	1 (33.3)	8 (80)	.02
History of recent genital trauma	8 (14.2)	14 (6.7)	
Orchiectomy	0	13 (93)	.07
Did not initially tell parents	—	12 (12.8)	
Orchiectomy		12 (100)	
Examined by provider in acute window	—	12 (12.8)	
Orchiectomy		12 (100)	

Results

A total of 218 patients underwent surgery for testicular torsion between 2005 and 2015. Nine patients under 2 years of age were excluded. Intermittent torsion could not be ruled out in 1 case. Overall, 114/208 (54.8%) patients presented in the acute setting compared with 94/208 (45.2%) in the delayed setting. Time from symptom onset significantly impacted orchiectomy rate as 24.6% of acute presentations underwent orchiectomy compared with 89.4% of delayed presentations ($P < .0001$). **Table I** shows descriptive statistics for all cases.

There were pronounced differences in reported symptoms and medical history depending on time of presentation. Nineteen (20.2%) patients presenting in the delayed setting reported initially feeling only abdominal pain and no scrotal pain. No patients in the acute presentation group reported isolated abdominal pain ($P < .0001$). Conversely, patients presenting in the acute setting tended to report isolated scrotal pain more commonly than patients in the delayed setting (71.1% vs 59.9%; $P = .11$). There were minor differences in the reported rates of nausea and vomiting, none of which reached statistical significance.

Patients in the delayed presentation group were 4 times more likely to have a developmental, cognitive, or social disorder than patients in the acute presentation group (10.6% vs 2.6%; $P = .02$). One-half of these patients in the delayed setting reported having autism spectrum disorder. Patients reporting history of recent genital trauma were twice as likely to present in the delayed vs acute setting (14.9% vs 7%; $P = .07$). None of the patients reporting history of recent genital trauma underwent orchiectomy when explored in the acute setting.

A subset of 12 patients from the delayed presentation group were initially misdiagnosed (**Table II**). These patients presented to a medical provider within 24 hours of symptom onset and were discharged with diagnoses other than testicular torsion before returning in the delayed window. Misdiagnosed patients were younger and weighed less than those correctly diagnosed in the acute setting (9.9 vs 12.9 years; $P = .006$; 42.6 vs 59.2 kg; $P = .01$). Developmental, cognitive, or social disorders were more common in the misdiagnosed group than the acute group (25% vs 2.6%; $P = .02$). All boys who were misdiagnosed eventually underwent orchiectomy compared with 24.6% of those correctly diagnosed in the acute period ($P < .0001$).

One-half of the misdiagnosed patients were initially diagnosed with a gastrointestinal illness. Initial isolated abdominal pain was reported by 33% of misdiagnosed patients and none of the acute group ($P < .0001$). Isolated scrotal pain was more common in those correctly diagnosed in the acute setting than those initially misdiagnosed (71.1% vs 41.6%; $P = .051$). Nausea and vomiting were reported by a smaller proportion of misdiagnosed patients than those presenting in the acute setting (16.7% vs 49.1%; $P = .036$).

Among the 12 misdiagnosed patients, evidence of a GU examination was missing in 3 (25%) while documentation was insufficient to confirm or exclude a GU examination in an additional 5 (41.7%). Scrotal imaging was ordered for 3 (25%) patients.