

Did COVID-19 Affect Time to Presentation in the Setting of Pediatric Testicular Torsion?

Annalise R. Littman, BS,* Karmon M. Janssen, DO, MS,* Li Tong, BS,† Hang Wu, BS,† May D. Wang, PhD,‡ Emily Blum, MD,* and Andrew J. Kirsch, MD*

Objectives: To determine if boys with acute testicular torsion, a surgical emergency requiring prompt diagnosis and treatment to optimize salvage of the testicle, delayed presentation to a medical facility and experienced an extended duration of symptoms (DoS), and secondarily, a higher rate of orchiectomy, during the coronavirus disease 2019 (COVID-19) pandemic.

Methods: Single-center, descriptive retrospective chart review of boys presenting with acute testicular torsion from March 15, to May 4, 2020 (“during COVID-19” or group 2), as well as for the same time window in the 5-year period from 2015 to 2019 (“pre-COVID-19” or group 1).

Results: A total of 78 boys met inclusion criteria, group 1 (n = 57) and group 2 (n = 21). The mean age was 12.86 ± 2.63 (group 1) and 12.86 ± 2.13 (group 2). Mean DoS before presentation at a medical facility was 23.2 ± 35.0 hours in group 1 compared with 21.3 ± 29.7 hours in group 2 ($P < 0.37$). When DoS was broken down into acute (<24 hours) versus delayed (≥ 24 hours), 41 (71.9%) of 57 boys in group 1 and 16 (76.2%) of 21 boys in group 2 presented within less than 24 hours of symptom onset ($P < 0.78$). There was no difference in rate of orchiectomy between group 1 and group 2 (44.7% vs 25%, $P < 0.17$), respectively.

Conclusions: Boys with acute testicular torsion in our catchment area did not delay presentation to a medical facility from March 15, to May 4, 2020, and did not subsequently undergo a higher rate of orchiectomy.

Key Words: coronavirus, COVID-19, testicular torsion, urology

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Testicular torsion requires prompt diagnosis and treatment within a 4- to 8-hour window of symptom onset to optimize salvage of the testicle.¹ Parental knowledge of testicular torsion is lacking,² and delay in presentation to the hospital has been found to be a significant factor leading to orchiectomy,³ which occurs at a rate of approximately 42% in boys aged 1 to 18 years.⁴ A 2019 study found that patients who presented within 24 hours of symptom onset had an 84% rate of testicular salvage versus a 25% salvage rate in patients who presented with longer than 24 hours of symptoms.⁵

A national state of emergency was declared in the United States in response to the COVID-19 pandemic on March 13, 2020. Statewide and local restrictions, such as stay-at-home orders and social distancing precautions, have been implemented throughout the United States in an attempt to slow its spread. The restrictions introduced by government officials in response to reported rates of COVID-19 and fear of contracting COVID-19 have been found to engender hesitancy in parents' accessing needed emergency healthcare services for their children.^{6–10}

There is limited literature looking specifically at the outcome measure of time to, or delay in, presentation to a medical facility in pediatric patients with non-COVID-19 conditions. One orthopedic study conducted at the Children's Hospital of Philadelphia looking at acute pediatric fractures from March 15, to April 15, 2020, found no increase in time to presentation to the emergency department (ED) during this period compared with the same time window in 2018 to 2019.¹¹ Additionally, a surveillance report from 7 United Kingdom and Irish hospitals found that 93.5% of parents did not report delaying their attendance to the ED for any reason during a 3-week period after a lockdown.¹²

We sought to determine if stay-at-home orders and social distancing precautions implemented in our area during COVID-19 affected the time to presentation in the setting of pediatric testicular torsion. We hypothesized that the public health restrictions implemented during the pandemic would lead to an increased duration of symptoms (DoS) and secondarily to an increased rate of orchiectomy.

METHODS

Our study was a single-center, retrospective chart review carried out after obtaining institutional review board approval (STUDY00000571). Hospital records were reviewed for boys, older than 1 year and younger than 18 years, presenting to our children's hospital facilities (a level I pediatric trauma hospital) for testicular torsion during the period March 15, to May 4, 2020 (“during COVID-19” or group 2) and compared with boys presenting during the same time window in a 5-year period between 2015 and 2019 (“pre-COVID-19” or group 1). A query using the International Classification of Diseases (ICD-10) code N44 and Common Procedural Technology (CPT) codes 54600 or 54620 was performed.

We chose March 15, 2020, as the start date because this corresponded with the local state of emergency declaration and shortly thereafter, all nonurgent surgical cases were put on hold at our institution. The end date, May 4, 2020, was the date our institution resumed elective surgical procedures, as well as being a few days after the Governor lifted statewide stay-at-home orders for most residents. Boys who presented during the 7-week period in the 5-year window from 2015 to 2019 combined (“pre-COVID-19”, group 1) were compared with boys who presented in the 7-week period in 2020 (“during COVID-19”, group 2). We excluded boys who were scheduled for nonacute bilateral orchiopexy, had a history of misdiagnosis of testicular torsion, or had nontesticular torsion diagnoses.

Data Collection

Demographic and clinical characteristics were obtained from chart review of boys who met study inclusion criteria. Duration of symptoms (in hours) before presentation at first medical facility, if manual detorsion was attempted in the ED, and surgical outcome (orchiectomy vs orchiopexy) were also analyzed. Duration of symptoms was defined as the boy or parent's subjective reporting of the duration of hours from the time the boy or parent first noted

From the *Department of Urology, Emory University and Children's Healthcare of Atlanta; †Department of Biomedical Engineering, and ‡Department of Biomedical Engineering, School of Electric and Computer Engineering, Georgia Institute of Technology and Emory University, Atlanta, GA.

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Reprints: Annalise Littman, BS, c/o Karmon Janssen, DO, MS, Children's Healthcare of Atlanta and Emory University School of Medicine, Suite 200, 5730 Glenridge Drive, Atlanta, GA 30328 (e-mail: arlittman@gmail.com). Copyright © 2021 Wolters Kluwer Health, Inc. All rights reserved. ISSN: 0749-5161

TABLE 1. Demographics of Patients in Group 1 (Pre-COVID-19) Compared With Group 2 (During COVID-19)

	Group 1 n = 57	Group 2 n = 21	P
Age (mean ± SD), y	12.86 ± 2.6	12.86 ± 2.1	0.92
Race			0.19
Black	26 (45.6%)	12 (57.1%)	0.45
White	24 (42%)	4 (19%)	0.07
Asian	1 (1.8%)	1 (4.8%)	0.47
American Indian/Alaska Native	1 (1.8%)	0 (0.0)	1
Declined to specify	5 (8.8%)	4 (19%)	0.24
Insurance status			0.26
Commercial	30 (52.6%)	11 (52.4%)	
Medicaid	23 (40.4%)	6 (28.6%)	
Self-pay/none	4 (7%)	4 (19%)	
Referral pattern			0.73
Direct presentation	17 (28.8%)	8 (38.1%)	
Transfer from OSH	15 (26.3%)	6 (28.6%)	
Transfer from PCP, UC	25 (43.9%)	7 (33.3%)	

OSH indicates outside hospital; PCP, primary care provider; UC, urgent care.

deviation from the boy's usual state of health to their presentation at a medical facility. If the child was transferred to our institution's ED from another hospital or referred from a primary care provider or urgent care clinic, the DoS was calculated from the time of onset of symptoms to their presentation at the first medical facility to which they presented. Duration of symptoms before presentation at the first medical facility was further broken down into categories of acute (<24 hours) and delayed (≥24 hours).

We analyzed a subset of boys who had ultrasound-confirmed testicular torsion (deficient or lack of color Doppler flow) or had clinically confirmed torsion and were taken directly to the operating room for scrotal exploration. This subgroup was reviewed to determine the rate of orchietomy versus orchiopexy between the 2 groups.

Continuous cohort variables were reported as mean ± standard deviation (SD) and analyzed via Mann-Whitney *U* tests. Categorical values were presented as absolute values with percentages and were analyzed utilizing Fisher exact tests. Statistical analyses were conducted using *R*, and *P* value less than 0.05 was considered statistically significant.

RESULTS

A total of 93 boys were identified, using ICD-10 and CPT codes, from March 15 to May 4, 2020 and from the same time window in the 5-year period between 2015 and 2019. Fifteen boys were excluded for having nonacute orchiopexy, misdiagnosis of testicular torsion, or nontesticular torsion diagnoses. The final cohort consisted of 78 boys, with 57 (73.1%) in group 1 and 21 (26.9%) in group 2.

The mean age was 12.86 ± 2.63 in group 1 and 12.86 ± 2.13 in group 2. There was no statistically significant difference between insurance group status (commercial vs Medicaid vs self-pay/none) or referral group status (direct presentation vs transfer from outside hospital vs transfer from primary care or urgent care) between the 2 groups. There was no statistically significant difference in race overall, although there were more White boys in group 1 than group 2 (*P* < 0.07) (Table 1).

The difference in mean DoS before presentation to a medical facility between the 2 groups was not statistically different (23.2 ± 35.0 hours in group 1 vs 21.3 ± 29.7 hours in group 2, *P* < 0.37) (Table 2). A total 41 (71.9%) of 57 boys and 16 (76.2%) in 21 boys in groups 1 and 2, respectively, presented to a medical facility within 24 hours of acute onset of symptoms. Furthermore, when DoS was broken down into acute (<24 hours) and delayed (≥24 hours) presentation, no statistically significant difference was found between group 1 and group 2 (*P* < 0.78).

A subset of 67 boys had their surgical outcomes compared between the 2 groups. We excluded 11 boys (*n* = 10 in group 1, *n* = 1 in group 2), because they were found to have intermittent torsion on ultrasound or manual detorsion had been attempted. There was no statistically significant difference found in the rate of orchietomy between group 1 and group 2 (44.7% vs 25%, *P* < 0.17).

DISCUSSION

After the declaration of a national emergency because of COVID-19 on March 13, 2020, stay-at-home orders, as well as restrictions on hospital clinic visits and elective surgical procedures,

TABLE 2. Average Duration of Symptoms Before Presentation at a Medical Facility Between Groups

	Group 1 n = 57	Group 2 n = 21	P*
Mean (SD), h	23.2 (35.0)	21.3 (29.7)	0.37
Acute (≤24 h), n (%)	41 (71.9)	16 (76.2)	0.78
Delayed (>24 h), n (%)	16 (28.1)	5 (23.8)	

Subset analysis of the 2 groups into acute vs delayed presentation. **P* < 0.05 considered statistically significant.

were incrementally implemented in counties and states across the nation. On March 15, 2020, a state of emergency for the city was declared by our mayor, and on March 17, 2020, our children's hospital ceased nonurgent elective cases. These restrictions created a new environment that we hypothesized would lead parents and boys to have concern about contracting COVID-19 and consequently delay in accessing medical care in a timely fashion.

Our study found that families did not delay presentation to a medical facility in the setting of acute testicular torsion during our COVID-19 study period and secondarily, the orchiectomy rate in the “during COVID-19” group was not greater when compared with the “pre-COVID-19” group. Our finding is consistent with the study conducted by Bram et al.¹¹ that found no increase in time-to-presentation for children with acute fractures during a 1-month period during the pandemic. Our results are also consistent with the study by Offenbacher et al,¹³ which found no change in the number of acute leukemia diagnoses, but a decrease in the number of diagnoses of solid tumors, which typically present indolently, during the height of the pandemic in NYC when compared with the same period in 2015 to 2019.

We acknowledge that our study is in contrast to several case reports of pediatric patients presenting to a hospital in advanced stages of several conditions, where parents' hesitancy, as well as other contributing factors, led to a delayed presentation during the COVID-19 pandemic.^{6–10} An e-survey conducted in the United Kingdom and Ireland found that 32% of pediatric consultants had seen children with delayed presentations of conditions such as diabetic ketoacidosis, sepsis, and malignancy.¹⁴ We hypothesize that parents are more likely to avoid a hospital during the pandemic if their child's condition developed relatively slowly or if the child's symptoms are vague or nonspecific, like a fever or generalized abdominal pain, where caregivers believe they can provide home-based care to manage their child's illness. In contrast, for an acute condition, like testicular torsion or bony fractures, caregivers may be more likely to emergently take a child to seek medical care.

There may be additional factors during our study period that contributed to the parents'/boys' timely presentation to the hospital. One such factor might be the degree of contact parents and children might have had with one another. During our COVID-19 pandemic study period, children were at home because schools had closed 3 days after the start of our study period, and many parents were also working from home or unemployed. These changes likely resulted in greater contact between parents and children and indirectly, an increased parental awareness of changes in his or her child's physical condition and ability to respond in a timely manner.

Our study is not without limitations. Because of the observational and retrospective study design, in 3% of the patients, we were unable to access all outside medical records, so the exact time of presentation to the first outside facility could not be verified. Our study was conducted using data from a single healthcare system, which may not be generalizable to other healthcare systems/regions. Also, during this pandemic, the incidence and prevalence of COVID-19, as well as statewide and local restrictions, have varied greatly throughout the United States.¹⁵ Therefore, the degree to which life was altered for families, and how the local infection rate or timing of orders might affect a parent's readiness to access healthcare for his or her child, may vary. Lastly, although our study site is a tertiary referral center that receives one of the largest number of cases of testicular torsion in our region, because of the relatively low prevalence of testicular torsion, our sample size was small, affecting our ability to sufficiently power the study to reach statistical significance.

We found no delay in time to presentation for boys with acute testicular torsion and subsequently, no increased rate of orchiectomy in relation to COVID-19 stay-at-home orders. Further research evaluating non-COVID-19-related disease presentations in other regions of the country differentially impacted by COVID-19 may shed light on the factors influencing when parents seek urgent medical care for their children during a time of crisis. Additionally, qualitative surveys of ED physicians, pediatric urologists, and parents/patients could be administered to determine if parents/patients delayed in presenting for testicular torsion because of COVID-19, and if so, what factors contributed to their delay.

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