Influence of COVID-19 pandemic on timing and outcomes of treatment for acute testicular torsion in adults: a single institution experience

Marco Frisenda, MD,[1,2*] Stefano Signore, MD,[1] Giampaolo Delicato, MD,[1] Andrea Giovanni Martinelli, MD,[1] Andrea Cantiani, MD,[1] Marco Colafelice, MD,[3] Antonio Tufano, MD,[2] Francesco Del Giudice, MD,[2] Michael L. Eisenberg, MD,[4] Alessandro Sciarra, MD,[2] Vittorio Canale, MD[1,2*]

[1]Department of Urology, Sant'Eugenio Hospital, Rome, Italy

[2]Department of Maternal-Infant and Urological Sciences, "Sapienza" Rome University, Policlinico Umberto I Hospital, Rome, Italy

[3]Department of Statistics, Sant'Eugenio Hospital, Rome, Italy

[4]Department of Urology, Stanford University School of Medicine, Stanford, California, USA

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Introduction: *The worldwide spread of SARS-COV2 had led to a delay in treatment of numerous urological pathologies, even in emergency conditions. We therefore sought to determine whether the timing of diagnosis and treatment and the postoperative outcome of patients with testicular torsion had been changed during the COVID pandemic.*

Materials and methods: *We considered all patients evaluated in the emergency department (ED) for testicular torsion from February 2018 to August 2019 (pre-COVID period) and from February 2020 to August 2021 (during COVID pandemic). All patients underwent clinical and ultrasound evaluation and subsequently scrotal exploration. Primary outcomes were the time differences from pain onset to ED presentation and from ED presentation to surgical treatment. We also investigated whether the number or orchiectomies required changed during the pandemic.*

Results: *A total of 54 patients were divided in two groups: 40 patients in pre-COVID-19 group and 14 in the COVID-19 cohort. Mean time from symptoms onset to ED access was longer during the pandemic (4.2 ± 5.7 versus 39.6 ± 37.3 hours, p = 0.009). Mean time from ED access to surgery was similar (2.9 ± 1.1 versus 4.2 ± 2.3, p = 0.355). In addition, the number of orchiectomies was higher in COVID-19 group (2.5% versus 28.6%, p < 0.01), compared to a lower number of detorsions (97.5% versus 71.4%, p < 0.01). Elapsed time from pain onset to surgery was directly correlated with the increased white blood cell (WBC) count after surgery (r = 0.399, p = 0.002).*

Discussion and conclusions: *The current study identifies a significant delay in presentation of testicular torsion which resulted in a significant increase in orchiectomies with the expected decreased in detorsion/orchiopexy. In addition, there was an increase in the WBC at presentation associated with delayed presentation.*

Key Words: testicular torsion, orchiectomy, orchidopexy, acute scrotum, COVID-19, SARS-COV2

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*equal contributors

Address correspondence to Dr. Vittorio Canale, Department of Urology, Saint'Eugenio Hospital, Rome, Italy

Introduction

Testicular torsion is a urological emergency that requires a prompt evaluation. If untreated, a prolonged absence or reduction of testicular blood

flow may lead to complete loss of testicular function necessitating orchiectomy. Testicular torsion is estimated to occur in 1/4000 males younger than 25 years.[1] Risk factors include underlying bell clapper deformity, undescended testicle, trauma and prior intermittent torsion.[2] Clinical presentation of a testicular torsion includes an acute scrotum (i.e. scrotal pain, vomiting, dysuria and fever). In addition, the testis is often retracted towards the inguinal canal with an abnormal lie. In addition, the cremasteric reflex is absent and the testicle may be swollen and hard. Pain tends to reduction after few hours which may be associated with a lower chance testicular salvage.[3]

Confounding diagnoses include torsion of appendix testis, epididymitis-orchitis, hydroceles, incarcerated inguinal hernias, varicoceles, testicular tumors, trauma and Fournier gangrene.[1]

Performing Doppler ultrasonography of the scrotum can be useful to define the correct diagnosis. The time window from diagnosis to treatment to optimize the chances for testicular salvage is between 4 and 8 hours from the symptoms onset.[4] In a recent study, patients who were treated within 24 hours from the symptoms onset had an 84% rate of testicular function salvage.[5]

The SARS-CoV2 pandemic caused a delay of non-COVID-19-related medical care, even for emergencies. Until the end of March 2021, there were over 3 million infections and over 100,000 deaths related to COVID-19 in Italy.[6] A full reorganization of urology and emergency departments had led to a prolonged time for other emergencies diagnosis and treatment.[7,8] Several radiological exams and endoscopic procedures had slowed to facilitate COVID-19 patients assistance. Furthermore, the fear generated by the pandemic or the increased waiting times might cause hesitation in some individuals to seek medical attention in the emergency department (ED).[9]

The aim of our study was to evaluate whether there has been a delay in time for the diagnosis and treatment of testicular torsion during the pandemic. The data also suggests that the prolonged time from the symptom onset, ED access and treatment led to an increased number of orchiectomies at the expense of orchidopexies.

Materials and methods

Population

The study was conducted in accordance with the Declaration of Helsinki (as revised in 2013). Informed consent was obtained from all the patients.

In this study, we collected data of 14 patients who presented to the ED with scrotal pain and a suspected diagnosis of testicular torsion, from February 2020 to August 2021 (i.e. COVID-19 pandemic). We compared these results with those retrospectively collected in a non-COVID-19 period from February 2018 to August 2019, for similar patients accessing to ED.

Therefore, our population was divided into two groups. Group 1 included 40 cases who were evaluated before the pandemic while Group 2 consisted of 14 patients evaluated for a testicular torsion during the pandemic.

Methods

All patients underwent a physical examination and a Doppler ultrasound evaluation upon their arrival. Presence of Gouverneur and Prehn sign were recorded. A Visual Analogue Scale (VAS) was used to standardize the intensity of scrotal pain and blood tests (e.g. complete blood count, C-reactive protein) were obtained from all patients.

Three ultrasound (US) patterns were described by ED radiologist: normal testicular blood flow, reduction of the blood flow or complete absence of blood flow. Scrotal exploration was performed in all patients with US reduction or absence of testicular blood flow or with a high clinical suspicion for testicular torsion. No difference in ED clinical practice occurred between the two groups.

Statistical analysis

For statistical evaluation an IBM SPSS Statistics program (Chicago, IL, USA, v.24) was used.

Descriptive analysis provided for the measurement of mean, median, mode, standard deviation and quartiles in order to assess the quantitative variables.

For the qualitative variables, the frequency and their relative percentages were measured. Statistical significance was evaluated at $p < 0.05$. Pearson's chi-square, Fisher's exact test and Student's test were used.

Our primary outcomes were to evaluate the difference in time from pain onset to the ED access in the two different periods: before and during COVID-19 pandemic, and whether there has been a larger number of orchiectomies instead of testicular sparing surgery in accordance with a delayed time of access at ED. We also considered difference in time from ED access to the surgical procedure.

Secondary outcomes were the differences of postoperative PCR and white blood count (lymphocytes, monocytes, neutrophils) in the two groups.

All the variables were statistically crossed with the testicular torsion degree, Echo Color Doppler

TABLE 1. **Clinical characteristics, surgical procedures and laboratory results in panel population and stratified on the basis of COVID-19**

Variable	Total population	Before COVID-19 outbreak	During COVID-19 pandemic	p value
No of patients (%)	54 (100)	40 (74)	14 (26)	
Age (years)				0.481
Mean ± SD	31.2 ± 16.8	30.6 ± 16.8	33 ± 17.4	
Median	25	24	32	
Range	13-70	13-62	14-70	
Torsion degree (%)				0.535
< 180°	23 (42)	17 (42.5)	6 (43)	
> 180° and < 360°	14 (26)	11 (27.5)	3 (21.3)	
> 360°	17 (32)	12 (30)	5 (35.7)	
Number of derotations + orchidopexies (%)	49 (90.7)	39 (97.5)	10 (71.4)	< 0.01
Number of orchiectomies (%)	5 (9.3)	1 (2.5)	4 (28.6)	< 0.01
Side of torsion (%)				0.122
Right	34 (63)	26 (65)	8 (57)	
Left	20 (37)	14 (35)	6 (43)	
Hours from symptoms onset to ED access				0.009
Mean ± SD	14.4 ± 24.3	4.21 ± 5.7	39.6 ± 37.3	
Median	5	3	66	
Range	1-120	1-24	4-120	
Hours from ED access to surgery				0.355
Mean ± SD	3.2 ± 1.6	2.9 ± 1.1	4.2 ± 2.3	
Median	3	3	5	
Range	1-9	1-6	1-9	
Aggregate time (hours from symptoms onset to surgery)				< 0.001
Mean ± SD	17.7 ± 25.3	8.5 ± 6.2	43.8 ± 38.7	
Median	8	6	34	
Range	2-129	2-29	6-129	
Patients with cryptorchidism (%)	19 (35.1)	14 (35)	5 (35.7)	0.095
Fever (%)	12 (22.2)	9 (22.5)	3 (21.4)	0.339
VAS scale				0.379
Mean ± SD	7.1 ± 1	7 ± 1	7.3 ± 1	
Median	7	7	7	
Range	6-9	6-9	6-8	
Gouverneur sign present (%)	28 (51.8)	22 (55)	6 (42.8)	0.012
Prehn sign present (%)	26 (48.1)	20 (50)	6 (42.8)	0.026
Cremasteric reflex present (%)	22 (40.7)	17 (42.8)	5 (35.7)	0.986

TABLE 1 (cont'd). **Clinical characteristics, surgical procedures and laboratory results in panel population and stratified on the basis of COVID-19**

Variable	Total population	Before COVID-19 outbreak	During COVID-19 pandemic	p value
ECD pattern (BFR) (%)				0.001
Absent	18 (33.3)	14 (35)	4 (28.6)	
Reduced	31 (57.4)	22 (55)	9 (64.3)	
Normal	5 (9.3)	4 (10)	1 (7.1)	
WBC				0.396
Mean ± SD	10.6 ± 2.3	10.4 ± 2.3	13 ± 3.5	
Median	11	10.4	8.2	
Range	3.5-23.2	3.5-23.2	5.5-14.7	
Neutrophils				0.415
Mean ± SD	7.1 ± 3.1	7.4 ± 3.05	6.5 ± 3.8	
Median	8	8	5	
Range	2-19.1	2.1-19.1	2-11.3	
Lymphocites				0.065
Mean ± SD	1.8 ± 0.7	2.1 ± 0.7	1.3 ± 0.5	
Median	2	2	2.5	
Range	0.7-11.8	0.7-5.8	1-11.8	
Monocytes				0.017
Mean ± SD	0.6 ± 0.6	0.5 ± 0.3	1.0 ± 1.1	
Median	0.5	0.4	0.5	
Range	0.1-3.7	0.1-1.6	0.2-3.7	
PCR				< 0.001
Mean ± SD	0.6 ± 0.8	0.5 ± 0.8	0.8 ± 1.01	
Median	0.2	0.1	0.3	
Range	0.01-2.99	0.01-2.99	0.04-2.97	

ED = emergency department; VAS = Visual Analogue Scale; ECD = Echo Color Doppler; BFR = blood flow rate; WBC = white blood cell; PCR = C-reactive protein

(ECD) pattern, VAS scale, the presence or absence of Gouverneur and Prehn signs and cremasteric reflex data.

Results

Demographics characteristics are described in Table 1. The number of cases was 40 in the pre-COVID-19 period and 14 in the COVID-19 period. The median age of the patients was 30.6 ± 16.8 in the pre-COVID-19 period and 33 ± 17.4 in the COVID-19 period, without statistically significant differences (p = 0.481).

During the pre-pandemic period, each patient underwent a surgical exploration (39 derotations/orchiopexies (97.5%) and 1 orchiectomy (2.5%)). Mean time from symptoms onset to surgery was 8.5 ± 6.2 hours (range 2-29 h). In 35% of patients, ECD pattern demonstrated absent blood flow rate and a reduced blood flow rate (BFR) in 55%.

During a similar length of time in the COVID-19 pandemic period, the number of suspected testicular torsion were 14. We performed a testicular derotation with orchidopexy in 10 cases (71.4%) and an orchiectomy in 4 cases (28.6%). Mean time from symptoms onset to surgery was longer with 43.8 ± 39.3 h (range 6 -129 h). A reduced BFR at ECD was seen in 64.3% of patients, and in 28.6% BFR was absent.

Significant differences were observed in the number of derotations/orchiopexies versus orchiectomies performed (p < 0.01). In addition, time from symptoms onset to surgery was statistically significant (p = 0.009), but not in terms of time from ED access to surgery, Table 1. Pearson correlation analysis showed a significant correlation between the increased time from symptoms onset to surgery and the increased number of radical orchiectomies in the COVID-19 group (r = 0.375; p = 0.005), Table 2.

TABLE 2. **Pearson's coefficent and p value for correlations between elapsed time and other variables**

Correlation	Coefficient	p value
Elapsed time[a] – type of surgery[b]	0.375	0.005
Elapsed time – WBC[c]	0.399	0.002
Elapsed time – monocytes	0	-
Elapsed time – lymphocites	-0.736	< 0.002
Elapsed time – neutrophils	-0.197	0.152
Elapsed time – PCR[d]	0	-
Elapsed time – torsion degree	-0.157	0.253
Elapsed time – fever	0.04	0.775
Elapsed time – VAS[e]	-0.08	0.563
Elapsed time – ECD[f] pattern	-0.07	0.614

[a]time from symptoms onset to surgery; [b]orchiectomy or derotation+orchidopexy; [c]WBC = white blood cell; [d]PCR = C-reactive protein; [e]VAS = Visual Analogue Scale; [f]ECD = Echo Color Doppler

Elapsed time from symptom onset also significantly correlated with WBC (r = 0.399; p = 0.002) and inversely with lymphocyte count (r = 0.736; p < 0.002), Table 2.

In addition, monocyte and PCR values were significantly higher in the COVID-19 group (p = 0.017 and p < 0.001), Table 1.

Discussion

In the current analysis, we assessed whether and how the COVID-19 pandemic affected the diagnosis and treatment of adolescent and adult patients with testicular torsion in our ED.

As expected, we found significant differences between the pre-COVID-19 and COVID-19 periods in terms of access to the ED from the onset of symptoms, testicular derotation versus orchiectomy rates as surgical decision. It is evident that during the COVID-19 period patients waited longer from the onset of pain to access the ED. This delay significantly resulted in an increased number of orchiectomies compared to testicular derotations.

These data contrast with those described in Nelson's study, which analyzes data on testicular torsions during the COVID-19 pandemic only in children, describing no difference in orchiectomy rates.[10,11] A larger multicenter study in childhood, showed that during COVID-19 pandemic, a prolonged time from symptom onset to ED access delayed surgical treatment, identifying a 13% higher rate of orchiectomy at surgical exploration.[12] There were no studies regarding testicular torsion in adults to make a comparison.

The reasons behind this delay in accessing the ED are uncertain but likely related to fear by patients of accessing health care and thus exposing themselves and other they care about to the SARS-CoV2 virus. Indeed, there has been a reduction in the number of patients who accessed the ED for other emergencies such as suspected heart attack, stroke or cancer for fear of exposing themselves to SARS-COV2.[13] We observed a similar pattern with regarding to an acute scrotum in our ED during pandemic.

The percentage of testicular derotations / orchiopexies in patients during the COVID period was lower than in the pre-COVID period, while the number of orchiectomies higher. This difference was likely driven by an increase in the average time from the onset of symptoms to ED presentation during the COVID period rather than by the time from presentation to the ED to the operating room (which was not influenced by pandemic). This latest finding is reassuring, as it indicates that the care in the ED in treating COVID-19 patients did not lead to a delay in the evaluation and treatment of non-COVID patients.

Importantly, the increase in leukocytosis in patients with testicular torsion during COVID-19 pandemic is probably due to the prolonged time from onset and ED access and evolution of testicular ischemia. All our patients were tested for SARS-COV2 at ED arrival during pandemic and no one was affected or had a positive COVID-19 anamnesis, so we can exclude a correlation between the two diseases on laboratory results.

While the outcomes of this study should be interpreted cautiously given the limited sample size, the differences in comparison periods still displayed statistical significance.

Conclusions

There has been an increase in number of non-pediatric patients treated for torsion of the testis with orchiectomy, during COVID-19 pandemic. This finding seems to be related to a delay in time to presentation rather than a change in hospital throughput. □

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