

ORIGINAL RESEARCH

Impact of COVID-19 Pandemic on Emergency Department Referrals with Urologic Complaints; a Retrospective Cross-Sectional Study

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Abstract: **Introduction:** Medical and surgical priorities were dramatically changed during the COVID-19 pandemic. This study aimed to evaluate the impact of this pandemic on presentation to emergency department (ED) with urologic complaint. **Methods:** This cross-sectional study was conducted at a tertiary urology referral center in Tehran, Iran. The data of all ED admissions were collected and the frequency of admissions with urologic complaint and their outcomes were compared between two 90-day periods (before and during COVID-19 era). **Results:** 480 ED admissions were studied. The number of patients visiting the ED with urologic complaint during COVID-19 era was significantly lower than the same period in the pre-COVID-19 period (125 vs. 355 admissions; $p = 0.01$). The mean hospitalization days for patients in the pre-COVID-19 period were significantly higher (5.6 ± 4.4 vs. 3.2 ± 4.2 days; $p < 0.001$). The most common patient complaints before and during COVID-19 period were flank pain (32.7%) and gross hematuria (32.8%), respectively. The number of patients discharged against medical advice in the COVID-19 period was significantly higher than before (22 (17.6%) vs. 10(2.8%); $p < 0.001$). The number of patients who developed severe complications was significantly higher in the COVID-19 period than in the pre-COVID-19 period ($p = 0.001$). **Conclusion:** During the COVID-19 pandemic we were faced with decreasing frequency of admission with urologic complaint, change in the pattern of referrals, decrease in the duration of hospitalization, increase in the number of patients discharged against medical advice, and increase in the number of cases with irreversible urologic complications or complications requiring surgery due to deferred treatment.

Keywords: COVID-19; Emergency Service, Hospital; Pandemics; Urology

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1. Introduction

Pneumonia of unknown etiology was reported in China at the end of December 2019, probably related to a seafood market (1). The authorities closed the market by the 1st of January 2020 and applied strict epidemiological investigations. As a result, scientists were able to isolate and perform genome sequencing of the 2019 novel Coronavirus (2019-nCoV) on the 7th of January and gave it to the World Health Organization



(WHO) on the 12th of January 2020 (2).

The first confirmed Coronavirus disease (COVID-19) infections in Iran were announced on 19 February 2020 (3). The World Health Organization declared the outbreak a Public Health Emergency of International Concern on 30 January 2020 and recognized it as a pandemic on 11 March 2020 (4, 5).

The COVID-19 virus is arguably the most significant challenge world healthcare systems have faced in the modern era. Medical and surgical priorities were dramatically changed at the time of this pandemic. To save facilities and resources for urgent cases and COVID-19 patients, all outpatient and elective activities were postponed by most of the world's hospitals (6). Stricter healthcare measures were also adopted, like suspending all non-urgent elective surgeries (7, 8) and limiting inpatient and outpatient services to critically ill patients, while increasing the critical care capacity (8-10).

Many studies were conducted to evaluate the effect of COVID-19 outbreak on the field of urology. Some of them assessed the impact of COVID-19 on the education of urology students and residents (11, 12), and others revealed the effect of the COVID-19 pandemic on patients with non-COVID-19 health problems, including urologic emergencies (13). All reported the negative effects of the COVID-19 outbreak.

We experienced an interesting situation in our hospital (a tertiary referral center for urology and one of the leading centers for admission of COVID-19-positive patients during the COVID-19 outbreak). In addition to a reduction in the number of emergency urology patients, we also encountered an increase in ill patients' request for discharge against medical advice, even after they were told that this could endanger their lives.

In this study, we attempt to evaluate the impact of the COVID-19 outbreak on urology emergency patients and follow the outcomes of patients who were discharged against medical advice.

2. Methods

2.1. Study design and setting

This retrospective cross-sectional study was conducted in Shohada-e-Tajrish Hospital, a tertiary urology referral center in Tehran, Iran. We reviewed the data of all patients admitted to the emergency department with urologic problems in two 90-day time periods, first, from February 20th to May 20th, 2019 (pre-COVID-19 epidemic period), and the second, from February 20th to May 20th, 2020 (COVID-19 epidemic period). Then the frequency of ED admissions with urologic complaint and their outcomes were compared between the two studied periods and possible causes were discussed. The protocol of the study was approved by Ethics committee of Shahid Beheshti University of Medical Sciences

(code: IR.SBMU.RETECH.REC.1400.211). Researchers adhered to confidentiality of patients' information and principles of Helsinki declaration regarding the ethical considerations in biomedical researches.

2.2. Participants

All patients who were admitted to ED with urologic complaints in those specific periods of time were included and patients who were admitted due to trauma and surgical complications were excluded. Also, patients who were managed by other specialists were excluded.

2.3. Data gathering

Using a pre-designed checklist, the patients' demographic characteristics, chief complaints, final diagnosis, and outcomes were recorded. In addition, patients who were discharged against medical advice during these two time periods were listed, and a telephone follow-up was conducted to determine their final outcomes. The outcomes were categorized into three groups: group one, those who died due to postponing their treatment. Group two included those who developed severe complications (irreversible complications or complications requiring surgery) due to deferred treatment, including renal failure, erectile dysfunction, orchietomy, and penile chordee. Group three included patients for whom a delay in treatment had no effect on their outcome or who were treated at another center.

2.4. Statistical analysis

The data were analyzed using SPSS (version 23). Continuous variables are presented as mean \pm standard deviation (SD). Categorical variables are presented as numbers (%). Statistical analyses such as chi-square and independent t-test were used. The significance level was set at 0.05.

3. Results

3.1. Baseline characteristics

480 ED admissions were studied. The number of patients visiting the ED with urologic complaint in the studied 90-day period after the beginning of the COVID-19 epidemic was significantly lower than the same period in the previous year (125 vs. 355 admissions; $p = 0.01$), despite the increase in total admission rate during COVID-19 pandemic. The male/female ratio was similar in the pre-COVID-19 period and during the COVID-19(289/66 vs. 107/18, respectively; $p = 0.33$). Total hospitalization time for patients in the pre-COVID-19 period was significantly higher (5.6 ± 4.4 vs. 3.2 ± 4.2 days; $p < 0.001$).



Table 1: Comparing the frequency of patients' chief complaints before and during the COVID-19 period

Chief complaint	Pre-COVID-19	During COVID-19	P value
Flank pain	116 (32.7)	22 (17.6)	0.001
Gross hematuria	81 (22.8)	41 (32.8)	0.032
Testis pain	40 (11.3)	27 (21.6)	0.006
Urinary retention	37 (10.4)	4 (3.2)	0.014
Lower urinary tract symptoms	30 (8.4)	0 (0)	<0.0001
LUTS and fever	21 (5.9)	11 (8.8)	0.297
Abdominal pain	17 (4.8)	6 (4.8)	0.401
Nausea and vomiting	7 (2)	4 (3.2)	0.488
Penile pain	6 (1.7)	10 (8)	0.002
Total patients	355 (100)	125 (100)	<0.001

Data are presented as frequency (%). LUTS: Lower Urinary Tract Symptoms.

Table 2: Characteristics of patients discharged against medical advice in the pre-COVID-19 period and their three-month follow-up

N	Age	Sex	CC	Underlying	Diagnosis	Treatment*	Follow-up
1	14	Male	Testis pain	Non	Testicular torsion	Surgery	Orchiectomy in another center
2	12	Male	Testis pain	Non	Testicular torsion	Surgery	Spontaneous Pain resolution
3	67	Male	Scrotal pain	DM, HTN	Fournier gangrene	Surgery	Expired
4	30	Female	Flank pain and fever	Non	Pyelonephritis	Admission and medical treatment	Revisit to emergency and admission
5	39	Male	Flank pain and N&V	Non	Urethral stone	Surgery	Spontaneous stone passage
6	55	Female	Flank pain and fever	DM, IHD	Emphysematous pyelonephritis	Surgery	Nephrectomy in another center
7	60	Male	Gross hematuria	HTN	Bladder mass	Surgery	Revisit 2 weeks later
8	70	Male	LUTS	CVA	Neurogenic bladder	Catheter insertion and evaluation	Revisit to another center
9	76	Male	Testis pain and fever	DM	Testicular abscess	Surgery	Orchiectomy
10	80	Male	Gross hematuria	Prostate cancer	Hemorrhagic cystitis	Admission and evaluation	Relative spontaneous recovery

Ages are presented in years; N: number; *: recommended treatment; CC: chief complaint; DM: Diabetes mellitus; HTN: Hypertension; IHD: Ischemic heart disease; N&V: Nausea and vomiting; LUTS: Lower urinary tract symptoms.

3.2. Chief complaints

Table 1 compares the frequency of patients' chief complaints before and during the pre-COVID-19 periods. In pre-COVID-19 period, flank pain (32.7%) was the most common patient complaint, followed by gross hematuria (22.8%) and testis pain (11.3%). But in the COVID-19 period, gross hematuria (32.8%) was the most common complaint, followed by testis pain (21.6%) and flank pain (17.6%). The number of patients discharged against medical advice in the COVID-19 period was significantly higher compared to the pre-COVID-19 period (22 (17.6%) vs. 10 (2.8%); $p < 0.001$).

3.3. Discharge against medical advice and its outcomes

Tables 2 and 3 show the characteristics of patients discharged against medical advice in the pre-COVID-19 and COVID-19 periods with their three-month follow-ups, respectively. The most common reason for discharge against medical advice in the pre-COVID-19 period was their willingness to seek treat-

ment at other centers (70%), treatment being unaffordable (20%), and uncertainty about treatment staff (10%); however, during the COVID-19 period, fear of getting COVID-19 in the hospital (80%) was the most common reason for self-discharge. The outcomes of patients discharged against medical advice in pre and during COVID-19 era are compared in table 4. The number of patients in group two (patients who developed severe complications) was significantly higher in the COVID-19 period compared to the pre-COVID-19 period ($p < 0.001$).

4. Discussion

Based on the findings, during the COVID-19 pandemic period we were faced with decreasing frequency of admissions due to urologic complaint, change in the pattern of referrals, decrease in the duration of hospitalization, and increase in the number of patients discharged against medical advice. The numbers of cases who developed irreversible urologic



Table 3: Characteristics of patients discharged against medical advice in the COVID-19 period and their three-month follow-up

N	Age	Sex	CC	Underlying	Diagnosis	Treatment*	Follow-up
1	54	Male	N&V, fatigue	HTN,BPH,DM	Uremia	Catheterization and work up	Renal failure & H/D
2	63	Male	Gross hematuria	Bladder cancer	Bladder cancer recurrence	Admission & cystoscopy	Relative recovery
3	31	Male	Flank pain & hematuria		Ureteral stone	TUL	Stone passage
4	64	Male	Gross hematuria		Bladder mass	TURT	Relative recovery
5	86	Male	Gross hematuria	DM,CVA	Prostate cancer	Admission and work up	Expired
6	56	Male	Flank pain after ESWL		Renal stone	Ureteral catheterization	Treatment 2 months later
7	72	Male	Scrotal pain and swelling	DM	Fournier gangrene	Surgery	Died
8	56	Female	Flank pain		Ureteral stone	Nephrostomy insertion	Decreased renal function
9	46	Male	Flank pain		Ureteral stone	TUL	Treatment in another center
10	70	Male	Gross hematuria	Bladder cancer	Bladder cancer recurrence	TURT	Radical cystectomy
11	28	Male	Penile pain/ ecchymosis		Penis fracture	Surgery	Penile chordee
12	12	Male	Scrotal pain		Testis torsion	Orchiopexy	Orchiectomy 24 hours later
13	30	Female	Flank pain and fever	Pregnancy, renal stone	Pyelonephritis	Nephrostomy insertion	Revisit to another center
14	52	Male	Penile pain	DM	Peyronie's disease	CCB injection	Penile chordee
15	78	Male	Gross hematuria	Prostate cancer	Tumor progression	Admission and cystoscopy	Revisit one month later
16	32	Male	Gross hematuria		Urethral wart	Wart excision	Revisit to another center
17	80	Male	Scrotal pain and swelling	Colon cancer, DM	Fournier gangrene	Surgery	Expired 48 hours later
18	69	Female	Flank pain		Renal stone	TUL	Died due to COVID-19
19	70	Male	Gross hematuria	Asthma	Bladder mass	TURT	Revisit one months later
20	69	Male	Urinary incontinency	DM,HTN	BPH	Catheterization	Renal failure
21	15	Male	Scrotal pain		Testis torsion	Orchiopexy	Orchiectomy
22	30	Male	Penile ecchymosis		Penis fracture	Surgery	Erectile dysfunction

Ages are presented in years; N: number; *: recommended treatment; CC: chief complaint; DM: Diabetes mellitus; HTN: Hypertension; CVA: Cerebrovascular accident; N&V: Nausea and vomiting; BPH: Benign prostatic hyperplasia; H/D: Hemodialysis; TUL: Transurethral lithotripsy; TURT: Transurethral resection of tumor; ESWL: Extracorporeal shock wave lithotripsy; CCB: Calcium channel blocker.

Table 4: Comparing the outcomes of patients discharged against medical advice between pre-COVID-19 and COVID-19 eras

Period	Total	Outcome			P value
		Group 1	Group 2	Group 3	
Pre-COVID-19	10(100)	1(10)	2(20)	7(70)	0.001
COVID-19	22(100)	2(9)	12(55)	8(36)	
P value	<0.001	0.16	0.001	0.03	

Data are presented as frequency (%). Group one: Those who died due to postponing their treatment;

Group two: Those who developed severe complications due to deferred treatment; Group three: Patients for whom a delay in treatment had no effect on their outcome or who were treated at another center.

complications or complications requiring surgery due to deferred treatment were also increased in the COVID-19 era. The COVID-19 pandemic in 2020 caused a sudden and double burden on the health care systems of all countries, and

different countries dealt with this situation in different ways. For example, in the field of urology, the first step was to suspend all non-urgent elective surgeries. The second step was to discharge inpatients at the first opportunity permitted by



the patient's clinical condition (7). These steps freed up more facilities and hospital beds for COVID-19 patients and decreased the length of hospital stay for patients with urological complaints.

Our research revealed significant reductions in emergency urologic visits to our hospital at the beginning of the COVID-19 pandemic. This result was confirmed by other studies in different countries (8, 13), with Motterle showing that seeking care in the year 2020 (vs. 2019) was a significant predictor of admission (OR:2.71). The results strongly suggest that COVID-19 significantly influenced people's urologic care-seeking behavior (14). We can conclude that the fear of being infected by COVID-19 made people avoid attending health care centers unless they had no other choice, instead preferring to tolerate or treat their problems conservatively. A reduction in elective urology surgeries and visits during the COVID-19 period is reasonable. However, a decrease in urology emergency visits is potentially dangerous because a delay in treatment for some patients could be life threatening or may cause severe complications.

While our hospital is a urology tertiary referral center, during the COVID-19 pandemic, it became a referral center for COVID-19 patients. Therefore, patients tended to stay in the hospital as little as possible due to fear of COVID-19 infection. As a result, the mean hospital stays were reduced significantly (5.6±4.4 vs. 3.2±4.2 days, p-value <0.001), and the rate of discharge against medical advice increased significantly (17.6% vs. 2.8%, p-value: 0.001).

For the first time, we followed up and compared the outcomes of patients discharged against medical advice and found that these patients had more than twice as many complications in the COVID-19 period than in the pre-COVID-19 period, when many complications were prevented with timely procedures.

Since we may face similar situations in the future, we need to be prepared. Many of the solutions introduced in this crisis were mainly based on prioritizing patients and surgeries (14); we would like to provide another solution. We suggest it would be better to determine a certain number of medical centers that would be able to provide the necessary emergency services to patients. The patients could then go to these "clean centers" confidently and without fear of contamination. In this plan, patients would not postpone their treatment due to fear of contamination, and performing some elective surgeries is possible. We suggest the idea of establishing "clean centers" for managing emergency patients as a viable solution for similar future situations.

5. Limitations

Some of the limitations of our study were the short period studied in this research and the limited amount of data col-

lected due to COVID-19's relatively short history. Future studies should cover the influence of COVID-19 pandemic on long-term urologic services and will be able to utilize a more extensive data set as more time passes.

6. Conclusion

Based on the findings, during the COVID-19 pandemic period we were faced with decrease in frequency of admissions due to urologic complaints, change in the pattern of referrals, decrease in the duration of hospitalization, and increase in the number of patients discharged against medical advice. The number of cases who developed irreversible urologic complications or complications requiring surgery due to deferred treatment were also increased in the COVID-19 era.

7. Declarations

7.1. Acknowledgments

We are thankful to all medical staff for their cooperating in the fight against COVID-19. Also, we appreciate all the efforts of personnel in charge of the hospital's archive of medical records for helping us gather the required data.

7.2. Data availability

Authors guarantee that data of the study are available and will be provided if anyone needs them.

7.3. Authors' contributions

AA: Conception and design, protocol development, gaining ethical approval, BJ: researched literature and conceived the study, NB: patient recruitment and data analysis, SAH and SMH: Collected the data; Contributed data or analysis tools, HK: Critical revision of the manuscript for important intellectual content, Supervision, ARR: wrote the first draft of the manuscript, AR: wrote the first draft of the manuscript, data analysis, Supervision

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7.5. Conflict of interest

The authors have no conflicts of interest relevant to this article.

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