

Overview of the Italian experience in surgical management of bladder cancer during first month of COVID-19 pandemic

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Summary *Objective: Overview of bladder cancer (BC) management in Italy during the first month of the COVID-19 pandemic (March 2020) with head to head comparison of the data from March 2019, considered "usual activity" period. The aim is to analyze performance of different Italian Centers in North, Center and South, with a special eye for Lombardy (the Italian epicenter).*

Patients and methods: During April 2020, a survey containing 14 multiple-choice questions focused on general staffing and surgical activity related to BC during the months of March 2019 and March 2020 was sent to 32 Italian Centers.

Statistical analysis was performed using IBM SPSS Statistics (v26) software. A Medline search was performed, in order to attempt a comparative analysis with published papers.

Results: 28 Centers answered, for a response rate of 87.5%.

Most of the urology staff in the Lombardy region were employed in COVID wards ($p = 0.003$), with a statistically significant reduction in the number of radical cystectomies (RC) performed during that time ($p = 0.036$). The total amount of RC across Italy remained the same between 2019 and 2020, however there was an increase in the number of surgeries performed in the Southern region. This was most likely due to travel restrictions limiting travel the North. The number of Trans-Urethral Resection of Bladder Tumors (TURBT) ($p = 0.046$) was higher in Academic Centers (AC) in 2020 ($p = 0.037$).

Conclusions: The data of our survey, although limited, represents a snap shot of the management of BC during the first month of the COVID-19 pandemic, which posed a major challenge for cancer centers seeking to provide care during an extremely dynamic clinical and political situation which requires maximum flexibility to be appropriately managed.

KEY WORDS: COVID-19; Urology; Pandemic; Outbreak; Bladder cancer; Non-muscle invasive bladder cancer; Trans-urethral resection of bladder tumor; Cystectomy; Hematuria.

Submitted 2 June 2020; Accepted 20 July 2020

INTRODUCTION

Bladder cancer (BC) represents 3% of all malignancies, with 549.000 new cases and 199.000 deaths were

reported worldwide in 2018 (1). This is generally associated with high levels of morbidity and mortality especially in patients over 70yrs. In the *United States* about 47% are estimated to be Ta/Tis at initial presentation, 21% stage I, 11% stage II, 4% stage III, and 6% stage IV disease (2). The cornerstones of BC surgical treatments are represented by *trans-urethral resection of bladder tumours* (TURBT) and *radical cystectomy* (RC).

Some papers were recently published regarding mortality risk from COVID-19 and BC: 63% of patients (pts) had one comorbidity (such as hypertension, cardiovascular, or pulmonary), 32% had two or more comorbidities, and the risks of dying from BC or from a competing disease were similar at 5 yrs after diagnosis (3, 4).

On March 11th, 2020, after the *World Health Organization* declared the disease caused by the novel Coronavirus SARS-COV-2 a pandemic, the exponential increase in the number of affected individuals led to a rapid reallocation of economic, infrastructural and health care resources, with redistribution of those medical/surgical, including urologic oncology, prioritizing urgent and emergent needs (5). This takes into consideration the evidence that almost 30% of individuals older than 65 years are at risk for developing acute respiratory distress syndrome after contracting COVID-19 and approximately 20% of asymptomatic individuals infected with COVID-19 may die after an elective operation (6, 7). However, the effect of this prioritization, as well as the clinical consequences of postponing surgical procedures, on patients and health care systems remains actively debated, despite recently published recommendations (7-12) (Table 1). Additionally, as demonstrated by *Liang et al.* and *Moschovas et al.*, the increasing risk of COVID-19 related complications in cancer patients has to be considered specifically, noting that a significantly higher proportion of patients will require ventilation in the *Intensive Care Unit* (ICU), with some dying as a consequence of these complications (13, 14).

Moreover, 25% of pts requiring high-priority surgery are considered at increased perioperative risk, which can be partially defined by cancer-related immunocompromised state and consequent higher susceptibility to

Table 1.
International Scientific Societies recommendations about surgical management of BC during pandemic.

Scientific Society	TURBT	Cystectomy
Italian Society of Urology (SIU) (https://www.siu.it) (9)	<i>Low priority (deferrable)</i> · TURBT after instillations · TURBT in low risk pts for progression <i>Intermediate priority</i> TURBT in pts with small recurrences <i>High priority:</i> · Pts with high risk of progression · 2 nd look TURBT for HG or T1	Never postpone
European Association of Urology (EAU) (https://uroweb.org/wp-content/uploads/EAU-Guidelines-Office-Rapid-Reaction-Group-An-organisation-wide-collaborative-effort-to-adapt-the-EAU-guidelines-recommendations-to-the-COVID-19-era.pdf) (10)	<i>Low priority (defer by 6 months):</i> · Small papillary recurrences (< 1 cm) and history of Ta/1 low grade tumour; · 2 nd TURBT in pts with visibly complete initial TURBT of T1 lesion with muscle in the specimen. <i>Intermediate priority (treat before end of 3 months):</i> Any primary tumour or recurrent papillary tumour > 1 cm and without hematuria or without history of HG NMIBC <i>High priority (treat within 6 weeks)</i> · Pts with bladder lesion and intermittent macroscopic hematuria or history of high-risk NMIBC; · 2 nd TURBT in pts with visibly residual tumour after initial resection and large or multiple T1HG at initial resection without muscle in the specimen	Cystectomy has to be performed within 3 months since the diagnosis in case of: · pts with highest risk NMIBC; · pts with BCG unresponsive tumor or BCG failure.
National Comprehensive Cancer Network (NCCN) (https://www.nccn.org/covid-19/pdf/Cancer_Services_Patient_Prioritization_Guidelines.pdf) (11)	Possible postponing low risk pts Not postponing high risk pts	
American Urological Association (https://www.facs.org/covid-19/clinical-guidance/triage) (12)	<i>High risk:</i> TURBT as scheduled <i>Not- high risk:</i> Postpone in 4-12 weeks	<i>High risk cancer:</i> Cystectomy as scheduled <i>Not- high risk cancer:</i> Postpone in 4-12 weeks

infections, compared to general population (5, 15). Furthermore, it is important to consider the most valuable resource that is personnel, as we observed a 30% shortage of health care workers due to hospital-acquired COVID-19 infection (16, 17).

We report on the surgical management of BC in different regions of Italy (with focus on Lombardy, as the Italian epicenter) during the first month of COVID-19 outbreak (March 2020), with head to head comparison with data from March 2019.

MATERIALS AND METHODS

A survey containing 14 multiple choice questions, focused on surgical activity related to BC carried out in March 2019 and March 2020, was sent to 32 *Italian Centers* (see appendix 1) during the first week of April 2020. We also queried medical staffing at these facilities: total amount of Urologists (including resident physicians) and percentage dedicated to COVID wards for each institute. 28 Centers answered (Table 2). To note, *non COVID-centers* (nCC) were defined as hospitals where only pts with negative nasopharyngeal swab and negative chest CT-scans were admitted. Statistical analysis of the data was performed using IBM SPSS Statistics (v26) software. We evaluated the geographic differences between Lombardy (the epicenter of pandemic), Northern centers outside Lombardy, Center and South. Moreover, we evaluated differences between *academic* (AC) and *non-academic centers* (NAC), according to location. We evaluated the number of RC, TURBT, *operative blocks* (OB) dedicated to urology and number of surgical procedures performed during March 2019 and

Table 2.
Main characteristics of centers who answered to survey.

Characteristic	Number
Total amount of centers who answered	28/32 (87.5%)
Academic Centers	15/28 (53.6%)
Emergency Room	24/28 (85.7%)
Non COVID-centers (nCC)	4/28 (14.3%)
Institutes located in North	14/28 (50%)
Institutes in Lombardy	11/28 (39.3%)
Institutes located in Centre	7/28 (25%)
Institutes located in South	7/28 (25%)

March 2020. We also compared the differences between AC and NAC. All the variables in this survey are nominal (categorical), so we tested the statistical differences between centers and location using chi-square test through crosstab function in our software.

RESULTS

Table 3 reported data about centers and their distribution across Italy. Several different statistical differences emerged comparing Lombardy hospitals and rest of Northern Italy in March 2020: number of OB dedicated to urology ($p = 0.027$); number of surgical procedures per OB ($p = 0.018$); number of TURBT ($p = 0.012$); number of *hemostatic Trans-Urethral Resection* (hTUR) ($p = 0.010$). These differences were no relevant considering Lombardy centers among Northern group.

Table 3.
Lombardy vs North vs Centre and South Italy centers.

	Lombardy	North Italy	Central Italy	South Italy	Total numbers	p
Number	11/28 (39.3)	3/28 (10.7%)	7/28 (25%)	7/28 (25%)		
Covid free						
yes	2/11 (18.2%)	0/3	2/7 (28.6%)	0/7	4/28 (14.3%)	0.518
no	9/11 (81.8%)	3/3	5/7 (71.4%)	7/7	24/28 (85.7%)	
Academic Hospital						
yes	4/11 (36.4%)	2/3 (66.7%)	5/7 (71.4%)	4/7 (57.1%)	15/28 (53.6%)	0.140
no	7/11 (63.6%)	1/3 (33.3%)	2/7 (28.6%)	3/7 (42.9%)	13/28 (46.2%)	
Emergency room:						
yes	9/11 (81.8%)	3/3	5/7 (71.4%)	7/7	24/28 (85.7%)	0.518
no	2/11 (18.2%)	0/3	2/7 (28.6%)	0/7	4/28 (14.3%)	
staff:						
< 10	5/11 (45.5%)	1/3 (33.3%)	3/7 (42.9%)	1/7 (14.3%)	10/28 (35.7%)	0.288
10-20	5/11 (45.5%)	0/3	1/7 (14.3%)	5/7 (71.4%)	11/28 (39.3%)	
> 20	1/11 (9.1%)	2/3 (66.7%)	3/7 (42.9%)	1/7 (14.3%)	7/28 (25%)	
Medical Doctors employed in Covid wards:						
< 30%	5/11 (45.5%)	3/3	7/7	7/7	22/28 (78.6%)	0.003
30%-50%	3/11 (27.3%)	0/3	0/7	0/7	3/28 (10.7%)	
> 50%	3/11 (27.3%)	0/3	0/7	0/7	3/28 (10.7%)	
Operating block dedicated to Urology Division during March 2020:						
0	4/11 (36.4%)	0/3	0/7	0/7	4/28 (14.3%)	0.027
1-2	1/11 (9.1%)	0/3	1/7 (14.3%)	2/7 (28.6%)	4/28 (14.3%)	
> 2	6/11 (54.5%)	3/3	6/7 (85.7%)	5/7 (71.4%)	20/28 (71.4%)	
Operating block dedicated to Urology Division during March 2019:						
0	0/11	0/3	0/7	0/7	0/28	0.329
1-2	1/11 (9.1%)	0/3	1/7 (14.3%)	3/7 (42.9%)	5/28 (17.9%)	
> 2	10/11 (90.9%)	3/3	6/7 (85.7%)	4/7 (57.1%)	23/28 (82.1%)	
Number of operation performed per operating block during March 2020:						
1	4/11 (36.4%)	0/3	0/7	0/7	4/28 (14.3%)	0.018
2-3	4/11 (36.4%)	3/3	5/7 (71.4%)	5/7 (71.4%)	17/28 (60.7%)	
> 3	3/11 (27.3%)	0/3	2/7 (28.6%)	2/7 (28.6%)	7/28 (25%)	
Number of operation performed per operating block during March 2019:						
1	0/11	0/3	0/7	1/7 (14.3%)	1/28 (3.6%)	0.688
2-3	7/11 (63.6%)	2/3 (66.7%)	3/7 (42.9%)	6 (85.7%)	18/28 (64.3%)	
> 3	4/11 (36.4%)	1/3 (33.3%)	4/7 (57.1%)	0/7	9/28 (32.1%)	
Number of trans-urethral resection performed during March 2020:						
<5	6/11 (54.5%)	0/3	0/7	1/7 (14.3%)	7/28 (25%)	0.012
5-15	4/11 (36.4%)	3/3	4/7 (57.1%)	3/7 (42.9%)	14/28 (50%)	
>15	3/11 (27.3%)	0/3	3/7 (42.9%)	3/7 (42.9%)	7/28 (25%)	
Number of trans-urethral resection performed during March 2019:						
< 5	0/11	0/3	0/7	1/7 (14.3%)	1/28 (3.6%)	0.664
5-15	4/11 (36.4%)	1/3 (33.3%)	3/7 (42.9%)	3/7 (42.9%)	11/28 (39.3%)	
> 15	7/11 (63.6%)	2/3 (66.7%)	4/7 (57.1%)	3/7 (42.9%)	16/28 (57.1%)	
Number of cystectomy performed during March 2020:						
0	6/11 (54.5%)	0/3	0/7	3/7 (42.9%)	9/28 (32.1%)	0.123
1-5	3/11 (27.3%)	2/3 (66.7%)	4/7 (57.1%)	3/7 (42.9%)	12/28 (42.9%)	
> 5	2/11 (18.2%)	1/3 (33.3%)	3/7 (42.9%)	1/7 (14.3%)	7/28 (25%)	
Number of cystectomy performed during March 2019:						
0	4/11 (36.4%)	0/3	2/7 (28.6%)	6/7 (85.7%)	12/28 (42.9%)	0.688
1-5	2/11 (18.2%)	1/3 (33.3%)	2/7 (28.6%)	1/7 (14.3%)	6/28 (21.4%)	
> 5	5/11 (45.5%)	2/3 (66.7%)	3/7 (42.9%)	0/7	10/28 (35.7%)	
Number of patients evaluated for hematuria during March 2020:						
< 5	7/11 (63.6%)	0/3	1/7 (14.3%)	3/7 (42.9%)	11/28 (39.3%)	0.072
5-10	1/11 (9.1%)	2/3 (66.7%)	2/7 (28.6%)	3/7 (42.9%)	8/28 (28.6%)	
> 10	3/11 (27.3%)	1/3 (33.3%)	4/7 (57.1%)	1/7 (14.3%)	9/28 (32.1%)	
Number of patients evaluated for hematuria during March 2019:						
< 5	2/11 (18.2%)	0/3	2/7 (28.6%)	2/7 (28.6%)	6/28 (21.4%)	0.937
5-10	3/11 (27.3%)	0/3	1/7 (14.3%)	3/7 (42.9%)	7/28 (25%)	
> 10	6/11 (54.5%)	3/3	4/7 (57.1%)	2/7 (28.6%)	15/28 (53.6%)	
Number of patients undergone to tur for hemostatic/diagnostic purpose during March 2020:						
0	7/11 (63.6%)	0/3	1/7 (14.3%)	1/7 (14.3%)	9/28 (32.1%)	0.010
< 50%	4/11 (36.4%)	3/3	4/7 (57.1%)	4/7 (57.1%)	15/28 (53.6%)	
> 50%	0/11	0/3	2/7 (28.6%)	2/7 (28.6%)	4/28 (14.3%)	
Number of patients undergone to tur for hemostatic/diagnostic purpose during March 2019:						
0	2/11 (18.2%)	0/3	2/7 (28.6%)	1/7 (14.3%)	5/28 (17.9%)	0.412
< 50%	7/11 (63.6%)	1/3 (33.3%)	3/7 (42.9%)	3/7 (42.9%)	14/28 (50%)	
> 50%	2/11 (18.2%)	2/3 (66.7%)	2/7 (28.6%)	3/7 (42.9%)	9/28 (32.1%)	

Compared to other hospitals across Italy during March 2020, Lombardy was the only region where a consistent number of urology staff were reassigned to COVID wards ($p = 0.003$) and four centers had no OB dedicated to urology ($p = 0.027$).

Table 4 describes differences in surgical activity, as well as patients with hematuria referred to emergency room (ER) in different parts of Italy in March 2019 and March 2020. A statistically significant reduction of the amount of RC in Lombardy ($p = 0.036$) was seen, as well as an increasing number of RC performed in the South ($p = 0.030$). The total amount of RC remained the same in 2019 and 2020, as more centers performed these opera-

Table 4.
Comparison of 2019 and 2020 activity in Lombardy, North, Centre and South of Italy.

	Lombardy	p	North	p	Central	p	South	p
Operating block dedicated to Urology Division during March 2020:								
0	4/11 (36.4%)		0/3		0/7		0/7	
1-2	1/11 (9.1%)		0/3		1/7 (14.3%)		2/7 (28.6%)	
> 2	6/11 (54.5%)	0.382	3/3	N.A.	6/7 (85.7%)	0.143	5/7 (71.4%)	0.714
Operating block dedicated to Urology Division during March 2019:								
0	0/11		0/3		0/7		0/7	
1-2	1/11 (9.1%)		0/3		1/7 (14.3%)		3/7 (42.9%)	
> 2	10/11 (90.9%)		3/3		6/7 (85.7%)		4/7 (57.1%)	
Number of operation performed per operating block during March 2020:								
1	4/11 (36.4%)		0/3		0/7		0/7	
2-3	4/11 (36.4%)		3/3		5/7 (71.4%)		5/7 (71.4%)	
> 3	3/11 (27.3%)	0.441	0/3	N.A.	2/7 (28.6%)	0.286	2/7 (28.6%)	0.286
Number of operation performed per operating block during March 2019:								
1	0/11		0/3		0/7		1/7 (14.3%)	
2-3	7/11 (63.6%)		2/3 (66.7%)		3/7 (42.9%)		6 (85.7%)	
> 3	4/11 (36.4%)		1/3 (33.3%)		4/7 (57.1%)		0/7	
Number of trans-urethral resection performed during March 2020:								
<5	6/11 (54.5%)		0/3		0/7		1/7 (14.3%)	
5-15	4/11 (36.4%)		3/3		4/7 (57.1%)		3/7 (42.9%)	
>15	3/11 (27.3%)	0.125	0/3	N.A.	3/7 (42.9%)	0.629	3/7 (42.9%)	0.629
Number of trans-urethral resection performed during March 2019:								
< 5	0/11		0/3		0/7		1/7 (14.3%)	
5-15	4/11 (36.4%)		1/3 (33.3%)		3/7 (42.9%)		3/7 (42.9%)	
> 15	7/11 (63.6%)		2/3 (66.7%)		4/7 (57.1%)		3/7 (42.9%)	
Number of cystectomy performed during March 2020:								
0	6/11 (54.5%)		0/3		3/7 (42.9%)		9/28 (32.1%)	
1-5	3/11 (27.3%)		2/3 (66.7%)		3/7 (42.9%)		12/28 (42.9%)	
> 5	2/11 (18.2%)	0.036	1/3 (33.3%)	0.667	1/7 (14.3%)	0.327	7/28 (25%)	0.030
Number of cystectomy performed during March 2019:								
0	4/11 (36.4%)		0/3		6/7 (85.7%)		12/28 (42.9%)	
1-5	2/11 (18.2%)		1/3 (33.3%)		1/7 (14.3%)		6/28 (21.4%)	
> 5	5/11 (45.5%)		2/3 (66.7%)		0/7		10/28 (35.7%)	
Number of patients evaluated for hematuria during March 2020:								
< 5	7/11 (63.6%)		0/3		1/7 (14.3%)		3/7 (42.9%)	
5-10	1/11 (9.1%)		2/3 (66.7%)		2/7 (28.6%)		3/7 (42.9%)	
> 10	3/11 (27.3%)	0.264	1/3 (33.3%)	N.A.	4/7 (57.1%)	0.068	1/7 (14.3%)	0.421
Number of patients evaluated for hematuria during March 2019:								
< 5	2/11 (18.2%)		0/3		2/7 (28.6%)		2/7 (28.6%)	
5-10	3/11 (27.3%)		0/3		1/7 (14.3%)		3/7 (42.9%)	
> 10	6/11 (54.5%)		3/3		4/7 (57.1%)		2/7 (28.6%)	
Number of patients undergone to tur for hemostatic/diagnostic purpose during March 2020:								
0	7/11 (63.6%)		0/3		1/7 (14.3%)		1/7 (14.3%)	
< 50%	4/11 (36.4%)		3/3		4/7 (57.1%)		4/7 (57.1%)	
> 50%	0/11	0.166	0/3	N.A.	2/7 (28.6%)	0.190	2/7 (28.6%)	0.033
Number of patients undergone to tur for hemostatic/diagnostic purpose during March 2019:								
0	2/11 (18.2%)		0/3		2/7 (28.6%)		1/7 (14.3%)	
< 50%	7/11 (63.6%)		1/3 (33.3%)		3/7 (42.9%)		3/7 (42.9%)	
> 50%	2/11 (18.2%)		2/3 (66.7%)		2/7 (28.6%)		3/7 (42.9%)	

tions in 2020, due to travel restrictions. Some statistically significant difference was observed comparing AC and NAC, with number of medical doctors, including residents, employed in COVID wards being greater in AC ($p = 0.001$). To note, the number of TURBT ($p = 0.046$) and number of RC was superior in AC in March 2020 ($p = 0.037$). Moreover, the AC differed in the number of interventions performed per OB ($p = 0.015$) and number of hTUR ($p = 0.014$), in favor of 2019. On the other hand, in NAC we did not observe any statistically differences in term of surgical performance from 2019 to 2020, except for the number of TURBT, which was higher in March 2019 ($p = 0.022$).

Finally, we tested the differences between AC and NAC in the different parts of Italy. In Lombardy, we did not find any statistical differences between AC and NAC in 2019 and in 2020 regarding: number of OB per week, number of interventions performed per OB, number of TURBT nor number of RC. We did not observe any differences in Lombardy between AC and NAC about patients referred to ER with hematuria requiring hTUR during March 2020 and 2019.

We did not find any statistical differences regarding the aforementioned parameters in the other three centers in the North (outside Lombardy).

In the Center regions, we saw statistical differences only in number of pts evaluated for hematuria ($p = 0.030$) and number of hTUR in 2019 ($p = 0.030$), with higher numbers performed in AC. Of note, 2 NAC included in this survey did not have emergency rooms.

Finally, there was no statistical differences in the aforementioned items in the Southern regions.

DISCUSSION

General performance of Italian centers during the first month of Pandemic

In Italy, from February, 27th to April 28th, 199,470 cases and 25,215 confirmed COVID-19-related deaths were reported (18). At the same time, a significant shortage of health care personnel was observed, with 20,831 health workers (10%) being affected by confirmed COVID-19 infection (5, 15, 18, 19).

The rapidly increasing number of pts affected by the SARS-Cov-2 virus have exerted significant pressure on the healthcare systems of Western countries in general, with an emphasis on maintaining emergency and essential services. The need to dedicate major economic, infrastructural and health care resources to assist SARS-Cov2 patients during the first weeks of the outbreak resulted in a rapid reallocation of staff, wards and equipment from several medical disciplines not primarily involved in the management of these pts (5, 20).

As a result, several facilities had to retrain or re-assign personnel to *COVID-Related Activities* (CRA), even if this was outside of their primary designation. The majority of hospital wards were converted to COVID-dedicated units and surgical were cases reduced because personnel and resources were reassigned.

In our study, all centers maintained 70% of their urological staff for “usual” urological activities and only 30%

were reassigned for CRA. Overall more physicians at AC, including residents, were assigned to COVID wards ($p = 0.001$). It is important underlying that, in the global emergency scenario caused by COVID-19 pandemic, the Urology residents’ training has been critically affected (especially for residents attending the final year of training), with a significant proportion of residents experiencing a severe reduction (> 40%) or complete suppression (> 80%) of training both for “clinical” activities and “surgical” activities, as reported by *Amparore et al.* (21).

While this involvement was particularly evident in Lombardy, with Urologists involved in CRA in more than 50% of the hospitals, in the *Centre and Southern Italy*, < 30% of Urologists were assigned to CRA.

We can therefore hypothesize that the greater the number of physicians on staff during the usual activity period, the greater the number assigned to CRA during the pandemic.

The data of our survey supports the findings of *Naspro* (8) and *Montorsi* (22), from *Giovanni XXIII Hospital in Bergamo* and *San Raffaele Hospital in Milan*, respectively (two of the primary centers for COVID-19 management during the pandemic). *Naspro* reported that, during the 10 days of the first cases of SARS-Cov2, two-thirds of the hospital beds were occupied by pts with COVID-19. Within two weeks, urological surgical volume was reduced to 30%, then 15% and then totally halted as of March 19. With the progression of the outbreak, all non-emergent urology surgeries were cancelled, with few exceptions for emergent and some urgent cases (8).

During our investigation we identified four *non-COVID centers* (nCC): two in the North and two in the Center. As expected, the number of urological procedures in nCC was almost identical to that of the same period in 2019. Referring pts to high-volume centers and surgeons potentially allows fast discharge and reduced number of complications (14, 23, 24). This organization also allowed for the residency program to proceed without interruptions in teaching program (25, 26).

There were no nCC in the South in our Survey, but we know that they have been created. This may be partly justified by the reduced number of COVID pts in Southern Italy (18).

Except in the South, where numbers were mildly increased, the total amount of surgical procedures were comprehensively reduced during 2020, with a wider geographic distribution of urological procedures. These is likely a direct result of strict travel restrictions during pandemic, which prevented patients living in the South from seeking medical care in the North of Italy, which was previously the norm.

A structural reorganization is essential during this time, as key elements, such as the duration of emergency, economic and social consequences, or the viral persistence in the population, are unknown (5). Therefore, rationing resources becomes mandatory, in order to ensure continuity of healthcare for COVID-free patients (27). Nevertheless, the Italian situation has to be considered as peculiar: preservation of COVID-19-free areas within mixed facilities turned out to be impossible: both caregivers and pts can bring the infection while asymptomatic, contributing to further nosocomial spread.

Overview on surgical management of bladder cancer during pandemic

When the COVID-19 outbreak expanded into Western Countries during the last weeks of February 2020, there were no recommendations about management of oncological surgical procedures, including urology. During the following weeks, several International and National Scientific Societies have published suggestions based on experts' opinions, using limited data available and with currently unknown impact on urologic practice (Table 1) (9-12).

Campi *et al.* recently found that approximately two thirds of pts with genitourinary malignancies do not require high-priority surgery, and 25% of pts requiring high-priority surgery are considered at high perioperative risk. This increasing risk is partially defined by the immunocompromised cancer-related state, which leads to increased susceptibility to infectious diseases compared to general population (15). During this pandemic, the risk of COVID-19 related complications, including ICU admissions, requiring mechanical ventilation and death, has been calculated to be 3.5 folds higher than usual (28). Conversely, Wang *et al.* have highlighted the risk for cancer pts who do not receive adequate and timely medical treatments during an outbreak, resulting in a potentially dangerous delay of uro-oncologic surgeries, with a final impact on the short and intermediate-term progression and mortality rates (19, 29, 30).

Trans-urethral resection of bladder tumor

According to the aforementioned Recommendations, TURBT for *Low Grade Non Muscle Invasive Bladder Cancer* (LG NMIBC) can be delayed in maximum 6 months during the COVID-19 outbreak. In case of *High Grade* (HG) NMIBC, the recommendations of all Societies advise against postponing interventions, due to the risk progression to muscle invasion/metastases in 15-40% and the Cancer Specific Mortality of around 10-20% (30, 31). In case of re-resection, the indications should be carefully evaluated, considering COVID-19 local incidence, patients' risk factors, BC risk, characteristics of initial TURBT, not forgetting the limited surgical capacity during pandemic.

The potential risk of stage migration due to postponing TURBT should always be taken into consideration.

Finally, most NMIBC patients should be considered at high risk of presenting with severe forms of COVID-19 that might require admission to an ICU and invasive ventilation. In this particular context, the urologist has a responsibility to evaluate the potential benefits and risks of performing TURBT at the time (32). Naturally, our results showed a decrease in total amount of TURBTs in March 2020 when compared to March 2019, especially in NAC ($p = 0.022$).

These data agree with those recently published by Oderda *et al.* who reported a restriction for TURBT of about 46% (15, 33). To note, the number of TURBT performed ($p = 0.046$) was superior in AC in 2020 ($p = 0.037$), probably due to superior number of medical staff and/or the presence of residents. Unfortunately, we did not collect detailed data about TURBT; thus, we cannot comment on this specific issue.

Radical cystectomy

RC should be prioritized to other urologic oncology procedures and never be postponed according to all recommendations during the crisis (Table 1). Delays exceeding 90 days between diagnosis/TURBT and RC are associated with worse survival (7, 34).

The intervention should be considered in patients at low risk of COVID-19 mortality and with high-risk disease features: presence of high-grade pT1 plus Tis, or tumors with lympho-vascular invasion, variant histology (eg, micro-papillary disease), residual grade 3/high-grade urothelial carcinoma on re-resection, or pT1 stage (35-37). The total amount of RC was decreased during the pandemic in Italy, consistent with a reduction of 46% in major uro-oncological surgeries across Europe.

Nevertheless, RC remained the second most common procedure performed during the COVID-19 outbreak (11.7% of all urological procedures) (15, 33).

In our survey, more centers performed this operations in 2020 vs 2019, with an increase in geographic availability of RC across Italy. To note, the number of RC performed in the South Centers during March 2020 did not decrease comparing to 2019; in common times Italian pts move routinely from the Southern regions to the North to address medical needs, as aforementioned. This trend was impacted by travel restrictions during outbreak, leading especially AC to perform RC.

Surgical management of emergency room accesses due to hematuria

The total amount of pts with hematuria and hTUR have generally decreased during COVID-19 outbreak, perhaps attributable to avoidance of the ER during the pandemic. In fact, while all the hospitals have performed hTUR in < 50% of cases during both 2019 and 2020, during 2019 more centers performed hTUR in up to 50% of cases. Considering differences in Centres, there was a difference in the number of pts evaluated for hematuria ($p = 0.030$) and number of hTUR in 2019 ($p = 0.030$) in favor of AC. Of note, two centers in this area did not have emergency rooms.

The number of hTUR increased only in the South centers and these data can be explained by the access to ER only in case of life-threatening hematuria and by travel restrictions. All these data can be justified by the general reduction of ER admissions because of non-COVID reasons.

Lombardy overview

During pandemic, most of the centers were dedicated to the management of COVID-19 and had an ER with medicals staff involved in CRA in more than 50% of the hospitals ($p = 0.003$). Consequently, the number of urological OB diminished, also considering that four centers had not any OB dedicated to urology, comparing to other hospitals across Italy ($p = 0.027$). On the other hand, there were more than two OB per week dedicated to urology in the most of the hospitals. However, the total amount of TURBT and RC diminished, similarly to the rest of Italy, even if these operations were more homogeneously distributed across the region, and this is demonstrated by the fact the number of centers which performed from 1 to 5 procedures increased.

CONCLUSIONS

The survey data supports the findings of the most recent papers, showing a global reduction in number of BC surgical procedures due to the prioritization given to COVID-19 pts management. However, we can affirm that the reduction was not so significant if we look at the different regions, especially the Southern ones. In fact, during pandemic, patients seek care at the nearest medical institution, not only for COVID-19 related reasons, overriding the strict travel limitations and leading to an improvement of “local” BC surgical management in the South.

Altogether, these data demonstrate the significant efforts were made by Italian Urologists to proceed with urgent surgical procedures despite COVID-19 outbreak. In our opinion, the improvement of management of pts may be optimized by having COVID-dedicated hospitals to guarantee high-quality, timely, and safe treatments to oncological patients. This leads to appropriate cure both for COVID and COVID-free pts who are affected with urologic cancer and should not have a delay in definitive management. The “overlapping” of COVID- and non-COVID wards could not ameliorate the management of all pts, because of the risk of transmitting infections by both pts themselves and medical/nursing staff, despite all the strict preventive measures.

Finally, COVID-19 pandemic represents an important challenge and learning opportunity for cancer centers, in the context of an extremely dynamic clinical and political situation which requires maximum flexibility to be appropriately faced. For example, telemedicine can represent an alternative for both multidisciplinary and follow-up visits, as suggested by the preliminary experience of Ambrosini *et al.* (38).

Our real-life data from several centers across Italy, despite limited, may represent an important insight into the BC surgical management in times of emergency, giving food for thought about the near future, which will likely be characterized by a prolonged coexistence with SARS-Cov-2 epidemic all over the world.

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