

Research Communication

Urology surgical activity and COVID-19: risk assessment at the epidemic peak: a Parisian multicentre experience

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Introduction

Coronavirus virus disease 2019 (COVID-19) has had a global impact on surgical activities. Precautionary principles pushed to restrain elective surgeries activities. The European Association of Urology Guidelines Office commissioned a Rapid Reaction Group to adapt the guidelines recommendations for the pandemic situation [1]. Some major key points were treating only high-priority and emergency cases surgically, considering older patients with comorbidity at severe risk of COVID-19 infection and fatal outcome, and testing staff and patients when resources were available. However, little is known about the COVID-19 specific nosocomial risk for patients undergoing urological surgery.

The Paris area was particularly struck by the pandemic. The regional mortality rate from 2 March to 17 April 2020 increased by 96% as compared to the same period in 2019 [2].

The aim of the present study was to determine the risks associated with surgery and COVID-19. The main outcomes were COVID-19-specific deaths and Intensive Care Unit (ICU) admission. To achieve this, we collected clinical data on patients undergoing urological operations during a 4-week period at the epidemic peak from the eight academic urology departments in the Paris area.

Patients and Methods

This is a multicentre cohort study. All of the eight Paris area academic urology centres (Assistance Publique Hôpitaux de Paris) participated. The protocol received Institutional Review Board approval and waived the informed consent obligation, as this was a non-interventional study based on regular healthcare data. As we aimed to assess the nosocomial risk for the surgical population, all the patients receiving surgery during the first 4 weeks of national surgical restriction were included. The patients' clinical status was updated at a minimum 3 weeks after the surgery to pass the potential incubation period. This status was collected from the medical file in case of death or current hospitalisation or with a telephone call when the patients were discharged.

A patient was considered as COVID-19 confirmed in the case of a positive reverse transcription PCR (RT-PCR) test or the presence of pathognomonic signs on chest CT scan.

The data collected included: the academic centre; patients demographic information; comorbidities; date of surgery; operation title; surgical approaches; emergency or oncological indications; type of anaesthesia (general, spinal, local); pre-/postoperative COVID-19 tests; postoperative symptoms (date, type) and more specifically fever, dry cough, muscle aches, shortness of breath, anosmia, ageusia, diarrhoea, vomiting, sore throat or other; COVID-19 specific hospitalisation/ICU admission/death, symptoms among patients surroundings.

Results

From 13 March to 9 April 2020, 552 patients received surgery within the eight academic centres; 495 (90%) patients' status were updated at a median time of 37 days and a minimum of 3 weeks after surgery, 57 (10%) were lost of follow-up. At the time of status update, 10/495 patients (2%) had been admitted to an ICU and eight of 495 (1.6%) had died. Patients' characteristics are reported in Table 1.

Regarding the type of surgeries, 166/552 (30%) patients presented for emergencies and 235 (43%) had oncological indications. The details on surgeries are reported in Table 2.

There was a significant difference within centres in terms of preoperative tests ($P < 0.001$; range 5–32%). The proportion of positive tests was also significantly different ($P < 0.001$; range 0–25%). There was no significant difference in terms of COVID-19-related postoperative symptoms ($P = 0.15$) or COVID-19-confirmed cases ($P = 0.79$).

For the preoperative COVID-19-positive cases, 11/80 patients had a positive test before surgery, one patient had a fever at the time of surgery; he required a JJ stent for an obstructive pyelonephritis and did not present any other symptoms postoperatively. Only one patient developed COVID-19-related symptoms (fever, shortness of breath and muscle aches) 22 days after a nephrostomy placement. One patient was already in the ICU for his COVID-19 and required a nephrostomy; he was still hospitalised in the ICU 47 days afterwards. After surgery, no patient required transfer to the ICU or died.

Regarding the preoperative COVID-19-negative cases, 69/80 patients had a negative preoperative test. Twelve (17%) developed COVID-19-related symptoms after surgery at a

median time of 13 days after surgery, the most common symptoms were fever (11 patients), muscle aches (five), and diarrhoea (three). Sixteen patients were tested (nine symptomatic, seven non symptomatic); three were positive. No patient required ICU admission or died after surgery.

Considering that the majority of the population did not have preoperative COVID-related symptoms or a positive test: they were 485 patients with the minimum 3-week follow-up. In all, 57 (12%) developed COVID-19-related symptoms at a median time of 12 days after surgery. The most common

Table 1 Patients' characteristics and comparison between the non-COVID-19 patients and postoperative COVID-19-confirmed patients.

Characteristic	Overall	Preoperative COVID-19	No COVID-19	Postoperative COVID-19	P*
<i>n</i>	552	10	526	16	
Age, years, median (IQR)	65.00 (55.00, 74.00)	70.00 (61.00, 73.25)	64.00 (54.00, 74.00)	64.00 (57.75, 78.50)	0.575
Gender, <i>n</i> (%)					
Male	389 (70.5)	8 (72.7)	374 (71.1)	8 (50.0)	0.122
Female	163 (29.5)	3 (27.3)	152 (28.9)	8 (50.0)	
BMI, kg/m ² , median (IQR)	25.01 (22.33, 27.70)	25.59 (23.43, 26.94)	24.91 (22.28, 27.68)	26.99 (26.51, 29.24)	0.021
Surgical emergency?	166 (30.3)	10 (90.9)	151 (28.9)	6 (37.5)	0.643
Yes, <i>n</i> (%)					
Oncological surgery?	235 (42.6)	1 (9.1)	227 (43.2)	7 (43.8)	1
Yes, <i>n</i> (%)					
Centre, <i>n</i> (%)					
BICETRE	52 (9.4)	1 (9.1)	49 (9.3)	2 (12.5)	0.791
BICHAT	83 (15.0)	1 (9.1)	80 (15.2)	2 (12.5)	
COCHIN	41 (7.4)	0 (0.0)	40 (7.6)	1 (6.2)	
HEGP	81 (14.7)	0 (0.0)	79 (15.0)	2 (12.5)	
HENRI MONDOR	63 (11.4)	3 (27.3)	58 (11.0)	3 (18.8)	
PITIE	111 (20.1)	4 (36.4)	106 (20.2)	1 (6.2)	
SAINT LOUIS	65 (11.8)	1 (9.1)	62 (11.8)	2 (12.5)	
TENON	56 (10.1)	1 (9.1)	52 (9.9)	3 (18.8)	
Chronic renal failure, <i>n</i> (%)					
NA	1 (0.2)	2 (18.2)	0 (0.0)	0 (0.0)	1
No	404 (75.7)	5 (45.5)	388 (76.2)	12 (75.0)	
Yes	129 (24.2)	4 (36.4)	121 (23.8)	4 (25.0)	
High blood pressure, <i>n</i> (%)					
NA	5 (0.9)	1 (9.1)	5 (1.0)	0 (0.0)	0.889
No	281 (52.7)	5 (45.5)	269 (53.0)	8 (50.0)	
Yes	247 (46.3)	5 (45.5)	234 (46.1)	8 (50.0)	
Diabetes, <i>n</i> (%)					
NA	1 (0.2)	1 (9.1)	1 (0.2)	0 (0.0)	0.954
No	411 (77.3)	7 (63.6)	393 (77.5)	12 (75.0)	
Yes	120 (22.6)	3 (27.3.0)	113 (22.3)	4 (25.0)	
Respiratory insufficiency, <i>n</i> (%)					
NA	1 (0.2)	1 (9.1)	1 (0.2)	0 (0.0)	0.144
No	497 (93.2)	10 (90.9)	475 (93.5)	13 (81.2)	
Yes	35 (6.6)	0 (0.0)	32 (6.3)	3 (18.8)	
Cardiac insufficiency, <i>n</i> (%)					
NA	2 (0.4)	1 (9.1)	2 (0.4)	1 (6.25)	0.008
No	481 (90.9)	10 (90.9)	459 (90.9)	13 (81.25)	
Yes	46 (8.7)	0 (0.0)	44 (8.7)	2 (12.5)	
Immunodeficiency, <i>n</i> (%)					
NA	2 (0.4)	2 (18.2)	1 (0.2)	0 (0.0)	0.85
No	478 (89.5)	9 (81.8)	455 (89.4)	15 (93.8)	
Yes	54 (10.1)	0 (0.0)	53 (10.4)	1 (6.2)	
Obesity, <i>n</i> (%)					
NA	59 (12.4)	3 (27.3)	55 (12.1)	1 (6.25)	<0.001
No	493 (87.6)	7 (63.6)	471 (87.9)	12 (75.00)	
Yes	59 (12.4)	1 (9.1)	55 (12.1)	3 (18.75)	
Type of anaesthesia, <i>n</i> (%)					
General	482 (87.8)	9 (81.8)	458 (87.6)	16 (100.0)	0.322
Local	52 (9.5)	2 (18.2)	50 (9.6)	0 (0.0)	
Regional anaesthesia	15 (2.7)	0 (0.0)	15 (2.9)	0 (0.0)	
COVID-19 ICU hospitalisation, <i>n</i> (%)					
NA	1 (0.3)	4 (0.0)	1 (0.3)	0 (0.0)	
No	309 (99.0)	6 (85.7)	295 (99.7)	15 (93.75)	
Yes	2 (0.6)	1 (14.3)	0 (0.0)	1 (6.25)	
COVID-19-specific death, <i>n</i> (%)					
Yes	3 (0.9)	0 (0.0)	0 (0.0)	3 (18.75)	

*No COVID-19 vs postoperative COVID-19-positive patients. NA, not available. Statistically significant values denoted in bold.

Table 2 Details on surgical procedures.

Surgery	Overall, n (%)	Preoperative COVID-19, n (%)	No COVID-19, n (%)	Postoperative COVID-19, n (%)	P
N	552 (100)	10	526	16	
Type of surgery, n (%)					0.113
Adrenalectomy	1 (0.2)	0 (0.0)	1 (0.2)	0 (0.0)	
Artificial sphincter revision or ablation	5 (0.9)	0 (0.0)	4 (0.8)	1 (6.2)	
BPH surgery	142 (25.8)	0 (0.0)	139 (26.4)	3 (18.8)	
Bleeding emergency	20 (3.6)	1 (10.0)	19 (3.6)	0 (0.0)	
Lymphadenectomy	5 (0.9)	1 (10.0)	4 (0.8)	0 (0.0)	
Orchidectomy	11 (2.0)	0 (0.0)	11 (2.1)	0 (0.0)	
Other	15 (2.7)	0 (0.0)	15 (2.9)	0 (0.0)	
Partial nephrectomy	20 (3.6)	0 (0.0)	20 (3.8)	0 (0.0)	
Partial penectomy	2 (0.4)	0 (0.0)	2 (0.4)	0 (0.0)	
Prostatic focal therapy	3 (0.5)	0 (0.0)	3 (0.6)	0 (0.0)	
Pyeloplasty	1 (0.2)	0 (0.0)	1 (0.2)	0 (0.0)	
Radical cystectomy	19 (3.4)	0 (0.0)	18 (3.4)	1 (6.2)	
Radical nephrectomy	35 (6.3)	0 (0.0)	33 (6.3)	2 (12.5)	
Radical prostatectomy	35 (6.3)	0 (0.0)	35 (6.7)	0 (0.0)	
Scrotal exploration	11 (2.0)	0 (0.0)	11 (2.1)	0 (0.0)	
Stone surgery	43 (7.8)	0 (0.0)	42 (8.0)	1 (6.2)	
Transplant-related surgery	9 (1.6)	0 (0.0)	8 (1.5)	1 (6.2)	
Ureteric stent/ nephrostomy	164 (29.7)	8 (80.0)	150 (28.5)	6 (37.5)	
Ureterectomy	2 (0.4)	0 (0.0)	2 (0.4)	0 (0.0)	
Urethral sling	2 (0.4)	0 (0.0)	1 (0.2)	1 (6.2)	
Urethrotomy	7 (1.3)	0 (0.0)	7 (1.3)	0 (0.0)	

symptoms were fever (40 patients), dry cough (15) and muscle aches (18). A total of 82 patients received a test after surgery (41 symptomatic, 41 non-symptomatic); 16 were positive. The overall postoperative COVID-19-positive test rate was 19.5%; it ranged from 2.4% (one of 41) for asymptomatic to 36.6% (15/41) for symptomatic patients. One patient (0.2%) required COVID-19-specific ICU hospitalisation. He developed symptoms (dry cough and sore throat) 12 days after surgery and was admitted to the ICU 6 days later. He died 28 days after surgery. Overall, three patients died of COVID-19 at 15, 17 and 28 days after surgery; they were aged 85, 89 and 75 years. Thus, the mortality rate for COVID-19-positive patients was three of 16 (18.7%). While comparing the COVID-19-positive patients confirmed after surgery with the non-COVID-19 patients, we found a higher proportion of patients with cardiac insufficiency (12.5% vs 8.7%, $P = 0.008$) and obesity (18.75% vs 12.1%, $P < 0.001$) among the COVID-19-positive patients. We did not find significant differences between the two groups within the centres, emergency status, oncological indication, the type of surgery, age, comorbidities, nor surgical approach. These results are reported in Table 1.

Discussion

The present study is the first report on overall urology surgical activities during the COVID-19 pandemic. The 4-week period of the present cohort inclusion was at the epidemic peak and mostly concomitant with the national

lockdown (17 March to 11 May), limiting the likelihood of extra-hospital contamination.

There are important informative facts from these outcomes. Firstly, the preoperative COVID-19-confirmed cases evolution appeared favourable, *per se*, without clinical status worsening (ICU transfer or death). These outcomes are better than the series reported by the COVIDSurg Collaborative [3] and Lei *et al.* [4]. Secondly, the nosocomial burden of surgical patients on the ICU department was very low, with only one (0.2%) patient requiring COVID-19-specific ICU admission after being infected perioperatively. Thirdly, as reported in previous reports [5,6], we found a higher proportion of patients with comorbidities (obesity and chronic cardiac failure) among the patients infected after their surgery. Fourthly, with three (0.6%) COVID-19-specific deaths after surgery, the specific mortality was low but not negligible. The mortality rate of 18.7% for patients confirmed with COVID-19 after the surgery is high. This outcome fits other series [3,4]. However, none of those studies had a systematic postoperative COVID-19 test. Therefore, the detection of postoperative disease was often made when symptoms were present and missed asymptomatic COVID-positive patients. This bias might lead to an overestimation of the mortality rate. For instance, our present series reports one COVID-19-positive patient out of 41 non-symptomatic tested before a second surgery or transfer to another institution. The detection of these asymptomatic COVID-positive patients could explain the slightly better outcomes in our present study (18.7%) than those of the COVIDSurg Collaborative [3]

(23.8%) or Lei *et al.* [4] (20.5%). Although we cannot completely rely on this 18.7% figure, it argues for the maintenance of surgery for indications that should not be postponed, particularly for elderly and frail patients. It is noteworthy that the mortality rate was higher than ICU admissions. Two of the deceased patients were aged 85 and 89 years and not eligible for intensive care.

A recent study from Paramore *et al.* [7] reported their single-centre experience of 52 patients undergoing urological surgeries during the first 3 weeks of the British lockdown in the area of Winchester. They updated the patient status 2 weeks after surgery and reported no COVID-19-related symptoms. However, 67% (35 patients) were ambulatory procedures. The number of patients analysed was limited (~10-times smaller than our multicentre cohort), with a shorter follow-up. Moreover, the Hampshire County was less affected than the London or Paris area, thus the nosocomial risk in their hospitals was lower.

Antonio Maria *et al.* [8] compared two urology sub-units outcomes in terms of postoperative infections in Lombardy, Italy. One unit belonged to an expert centre for infective epidemics. They reported three COVID-19-positive postoperative cases out of 63 patients in the non-expert hospital, with no case out of 77 in the COVID-19 hospital.

Luong-Nguyen *et al.* [9] reported a multicentre experience from three academic visceral surgery centres in the same hospital group as us (Assistance Publique Hôpitaux de Paris). Interestingly, their outcomes were relatively similar to ours with a 0.7% (two of 305) COVID-19-specific mortality after surgery.

However, it is difficult to compare with other centres going through the peak of the pandemic at different time points than our present reported experience, when less or more may have been understood about preoperative testing, personal protective equipment, cold sites etc.

A limitation of the present study is the low rate of COVID-19 tests. There was a nationwide shortage of RT-PCR at the beginning of the pandemic. The low preoperative test rate (14%) reduces links to the nosocomial origin of the infection. The low postoperative test rate (17%) reduces detection of non-symptomatic patients. However, we can conclude on the severe postoperative infection rates leading to ICU admission or death.

Conclusion

The present study reports the largest experience of urological surgery in the era of COVID-19 pandemic in a heavily affected area. It concludes with a minimal impact of the postoperative nosocomial disease on ICUs and a limited but real risk of COVID-19-specific death after surgery, particularly for the elderly. These results should influence





urology departments' strategies in areas affected by future epidemic waves.

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Conflict of Interest

Authors declare no conflict of interest.

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Abbreviations: COVID-19, coronavirus virus disease 2019; ICU, Intensive Care Unit; RT-PCR, reverse transcription PCR.