

## Research Communication

# Martini-Klinik experience of prostate cancer surgery during the early phase of the COVID-19 pandemic

## Introduction

In order to restrain the uncontrolled spread of the 2019 coronavirus, COVID-19, and to provide sufficient intensive care unit (ICU) capacity, medical specializations needed to develop new routines and risk strategy protocols. Those restrictions have also impacted the urological community. Several medical organizations have developed specific information hubs, blogs and resource centres focused on how to tackle the COVID-19 situation [1–3]. Although the German Society of Urology (*Deutsche Gesellschaft für Urologie*) published a recommendation to evaluate the need for timely therapy in patients with prostate cancer (PCa) according to D'Amico risk groups on 2 April 2020, to date there have been no compulsory directives regarding omitting radical prostatectomy during the COVID-19 pandemic. The Martini-Klinik Prostate Cancer Centre (MK) at the University Hospital Hamburg-Eppendorf (UHH) continued to perform surgery for PCa with risk-adjusted special precautions. In the present study, we share our initial experiences, routines and results of treating patients in the early phase of the COVID-19 pandemic.

## Patients and Methods

After approval of the study by our institutional review board, we performed a retrospective analysis of patient and preoperative tumour characteristics, and short-term complications of patients with PCa undergoing radical prostatectomy at our institution before and during the early phase of the COVID-19 pandemic in Germany. One group represented a consecutive cohort of patients with PCa treated in the period after the first COVID-19 case at UHH was detected (27 February 2020 to 17 April 2020), while the second group represented consecutive patients treated in the period before the first COVID-19 case (1 January to 26 February 2020).

We evaluated the possible short-term postoperative complications and circumstances that occurred in relation to COVID-19. Putative factors that would predispose patients to a potentially worse outcome in case of infection or that increased the probability of being dependent on postoperative ICU care (focusing on patient age, cardiovascular disease and hypertension, obstructive sleep apnoea syndrome, diabetes mellitus, chronic lung, kidney or liver disease, and severe obesity) were assessed by evaluation of patient history. All analysed patients gave their informed consent for data analysis. All clinical and patient data were stored in a secured and pseudonymized database in the MK.

COVID-19 Measures Undertaken by the University Hospital Hamburg/Martini-Klinik

In close communication with the official German public health institute, the Robert-Koch Institute (RKI) [4], a task force defined the procedures and safety measures required for all sections of the UHH, thus including the MK, since the first COVID-19 patient was identified in Germany. In addition to being physically 'disconnected' from the main complex of the UHH and offering only one- and two-bed rooms, thus benefiting from certain advantages in terms of infection control, further measures were established in the MK in concordance with the task force. No COVID-19 testing was routinely performed prior to surgery; however, before hospital admission and again prior to surgery, patients were repeatedly asked about COVID-19 exposure or symptoms (see Appendix S1). Patients with potential COVID-19 exposure were only admitted after a symptom-free period of >14 days and negative testing. Further COVID-19 measures undertaken by the UHH task force and the MK are shown in Fig. 1.

## Statistical Analyses

Descriptive statistics of categorical variables are given as frequencies and proportions. Medians and interquartile ranges (IQR) are reported for continuously coded variables. For all statistical analyses, R software environment for statistical computing (version 3.4.3) was used. All tests were two-sided, with a level of statistical significance set at  $P < 0.05$ .

## Results

We compared the results of 447 patients treated prior to the COVID-19 pandemic with those of 337 patients treated during the early phase of COVID-19. Patient characteristics, including preoperative tumour characteristics, were comparable. Further results are depicted in Table 1.

Twenty-six planned surgeries have been postponed or cancelled as a result of the COVID-19 situation. The first COVID-19-related prophylactic cancellations of surgeries in the MK occurred on 12 March. Two planned patients were confirmed to be COVID-19-positive (by their general practitioners) before admission to the MK. Surgery for 13 patients was postponed due to a high risk of inheriting a COVID-19 infection and a total of 11 patients chose to cancel because of fear of the COVID-19 situation in general. No patient with confirmed COVID-19 has been present

**Table 1** Patient and tumour characteristics of 447 patients treated prior to the COVID-19 pandemic compared with the 337 patients treated during the early COVID-19 phase at the Martini-Klinik Prostate Cancer Centre Hamburg.

Variables	Overall	Pre-COVID-19 pandemic	Early phase of COVID-19 pandemic	P
Age, years	64 (58.8–69)	64 (58–68)	64 (59–69)	0.89
Median (IQR)				
BMI, kg/m <sup>2</sup>	26.5 (24.7–29.1)	26.6 (24.8–29.1)	26.3 (24.5–28.7)	0.30
Median (IQR)				
PSA, ng/mL	7.6 (5.5–11.8)	7.5 (5.4–12)	7.6 (5.5–11.6)	0.82
Median (IQR)				
ISUP grading (biopsy), n (%)				
I	187 (23.9)	105 (23.5)	82 (24.3)	0.16
II	291 (37.1)	165 (36.9)	126 (37.4)	
III	145 (18.5)	82 (18.3)	63 (18.7)	
IV	89 (11.4)	53 (11.9)	36 (10.7)	
V	59 (7.5)	30 (6.7)	29 (8.6)	
NA	13 (1.7)	12 (2.7)	1 (0.3)	
Comorbidities*, n (%)				
Yes	418 (53.3)	248 (55.5)	170 (50.4)	0.18
No	366 (46.7)	199 (44.5)	167 (49.6)	
ASA score, n (%)				
I	56 (7.1)	36 (8.1)	20 (5.9)	0.40
II	613 (78.2)	341 (76.3)	272 (80.7)	
III	111 (14.2)	67 (15)	44 (13.1)	
IV	1 (0.1)	1 (0.2)	0 (0)	
Surgical approach, n (%)				
RARP	455 (58)	257 (57.5)	198 (58.8)	0.77
ORP	329 (42)	190 (42.5)	139 (41.2)	
LOS (days)	7 (6–8)	7 (7–8)	7 (6–8)	<0.01
Median (IQR)				
Complications <sup>†</sup> , n (%)				
I	56 (7.1)	35 (7.8)	21 (6.2)	0.63
II	70 (8.9)	44 (9.8)	26 (7.7)	
IIIa	22 (2.8)	14 (3.1)	8 (2.4)	
IIIb	13 (1.7)	8 (1.8)	5 (1.5)	
IVa	7 (0.9)	5 (1.1)	2 (0.6)	
None	616 (78.6)	341 (76.3)	275 (81.6)	

\*ASA, American Society of Anaesthesiologists; BMI, body mass index; IQR, interquartile range; ICU, intensive care unit; ISUP, International Society of Urological Pathology; LOS, length of hospital stay; ORP, open radical prostatectomy; RARP, robot-assisted radical prostatectomy. Comorbidities: predisposing factors for a potentially worse outcome in case of a COVID-19 infection or increasing the probability of being dependent on postoperative ICU care, such as cardiovascular disease, hypertension, obstructive sleep apnoea syndrome, diabetes mellitus and chronic lung, kidney or liver disease. <sup>†</sup>Complications according to the Clavien–Dindo Classification.

within the MK to date. Of 230 clinic staff members, 31 have been tested for COVID-19, mainly after returning from RKI-declared COVID-19 risk regions after holidays or business travel. One MK ward nurse was confirmed as COVID-19-positive on 21 April without evidence of the origin of infection. After having created contact lists, all staff members and patients who have been in contact with the nurse have been tested and their results were negative.

### Intensive Care Occupancy During the Early Phase of COVID-19

We have noted a slight decrease in the number of ICU transfers during the early COVID-19 phase ( $n = 19$ ; median [IQR] 2 [0–2.25] per week) compared to the pre-COVID-19 phase ( $n = 26$ ; median [IQR] 3 [2.75–3.25] per week).

The main reason for ICU transfers was a precautionary relocation, prompted by institutional standards of the anaesthesiology department, in order to ensure monitoring for

patients who were not assumed fit enough for the ward. Those relocations lasted only for the first postoperative night and retransfer to the MK was arranged on the first postoperative day. Two patients, however, were relocated to the ICU because of Clavien IV complications (pulmonary embolism and haemorrhagic shock) during the COVID-19 phase.

### Short-term Complications Attributable to COVID-19

As no COVID-19 case occurred in our clinic during the early phase of the pandemic, we were unable to identify COVID-19-related complications in our patients. Moreover, we did not identify any association with potentially concealed COVID-19 infections. Further short-term surgical complications are shown in Table 1.

## Discussion

Our data demonstrate the feasibility of continuing surgery for PCa in a prepared setting. However, we acknowledge that the

Time period	Infections Germany	Infections Hamburg (*)	Infections UHH**
on 27 Feb	<100	1	1
02 Mar - 08 Mar	262	3	1
09 Mar - 15 Mar	4838	162 (8.8)	2
16 Mar - 22 Mar	18.610	872 (47)	18
23 Mar - 29 Mar	52.547	1846(100)	36
30 Mar - 05 Apr	91.714	2945 (160)	35
06 Apr - 12 Apr	120.479	3742 (203)	53
13 Apr - 19 Apr	139.897	4167 (226)	48

(\*) COVID-19 cases per 100.000  
 \*\* inpatient treatment at the UHH

General measures at UHH:	Specific measures at MK:
<ul style="list-style-type: none"> <li>- Quarantine and strict testing for staff members of high risk for infection</li> <li>- No further business travelling allowed</li> <li>- Visiting ban at UHH</li> <li>- Increase ICU capacity from 120 to 150 beds</li> <li>- Establish an explicit department for assessing upper respiratory tract symptoms</li> <li>- Reduce surgical and conservative procedures by 50% (focus on urgent/oncological procedures)</li> <li>- Hold 60% free beds throughout the UHH</li> <li>- Mandatory wearing of protective face masks for all staff members in contact with any patient (Non FFP2-3; except for contact with COVID-19 patients)</li> </ul>	<ul style="list-style-type: none"> <li>- Reduction of surgical programme (12 → 10 RPs)</li> <li>- RPs only on the MK premises (to reduce fluctuation to UHH OR's)</li> <li>- Mandatory wearing of face masks (non FFP2-3) in the OR and wards, also in non-septic areas</li> <li>- Permanently fixed anaesthetics team in the MK</li> <li>- "Online-morning briefing" for medical staff</li> <li>- Telephone consultation replaced regular outpatient consultations</li> <li>- Centralization of all patient admissions to one specific sector within MK</li> <li>- No elective postoperative x-ray cystography to exclude anastomosis leakage (which was also usually performed within the main UHH complex)</li> <li>- If possible, try to reduce length of stay</li> <li>- Critically assess comorbidities which potentially absorb ICU capacity in the acute postoperative phase (<i>cardiovascular disease;hypertension;diabetes mellitus; asthma; chronic lung, kidney or liver disease; severe obesity; OSAS</i>)</li> </ul> <p>OSAS precautions included:</p> <ul style="list-style-type: none"> <li>- OSAS with own CPAP mask: surgery possible if no other relevant restrictive comorbidities are present</li> <li>- OSAS without own CPAP mask: surgery was postponed</li> <li>- STOP-Bang Score 1&gt;4: surgery possible under special circumstances: extended anaesthesiological supervision of the patient in the recovery room until at least 9 p.m.; then, continuous monitor surveillance was performed by a specifically trained nurse</li> </ul>

**Fig. 1** Measures taken by University Hospital Hamburg-Eppendorf (UHH) and the Martini-Klinik Prostate Cancer Center (MK) since the first positive COVID-19 case was identified in Germany on 27 January 2020. For further comprehension, weekly numbers of COVID-19 infections in Germany and the city of Hamburg as well as hospitalized patients at the UHH have been added, based on official numbers of the Robert Koch Institute and the UHH task force. CPAP, continuous positive airway pressure; FFP, filtering face piece; ICU, intensive care unit; OR, operating room; OSAS, obstructive sleep apnoea syndrome; RP, radical prostatectomy. <sup>1</sup>snoring, tiredness, observed apnoea, high blood pressure, body mass index, age, neck circumference, and male gender (STOP-Bang) questionnaire' to screen for potential OSAS was applied for all patients admitted to the MK.

precautions and measures we have implemented within the MK might differ in other institutions or countries. Our experience was mainly possible because the German health system, and specifically the UHH, has an extraordinary hospital bed and ICU capacity, which provided some leeway, especially in this early phase of the COVID-19 pandemic. Furthermore, the MK is in the special position of not being physically connected to the main UHH complex of buildings

and, therefore, we were able to treat our patients in reasonably protected surroundings. As we usually do not discharge patients before monitoring them for at least 3 days after surgery, we were able to recognize potential early COVID-19-related complications. If any signs of overstretching the UHH capacity had occurred, we would have taken action to drastically decrease our activity. If necessary, the MK would have given over its bed capacity

(and will do so) to prevent the emergence of a potentially uncontrollable situation.

Notably, we did not perform COVID-19 screening routinely but, instead, trusted in thorough and repeated assessment of patient history prior to admission to the clinic. With regard to the general population, the RKI initially recommended testing only for patients with explicit symptoms and those with a very high risk of harbouring COVID-19 (e.g. people in close contact with a confirmed case), while in later days, because of the increased availability of tests, the recommendation has been to additionally test mildly symptomatic persons. Very recently we decided to perform in-house reverse real-time RT-PCR for all patients admitted to MK prior to surgery.

We are aware that this virus is unpredictable and, therefore, further adjustments of our actions will most likely have to be considered in the future in order to decrease the probability of further spread and of potentially avoidable complications or deaths. Although it is indisputable that cancer surgery cannot be postponed indefinitely, a certain delay in the treatment of PCa because of the COVID-19 pandemic might not influence oncological outcomes [3,5]. Nevertheless, mainly as a result of the rapid roll of events and in some extent inconsistent official information and guidelines on COVID-19 related restrictions during the early phase of the virus in Germany, we continued to perform surgeries for all risk groups as most of these patients had already received a diagnosis and had been enrolled on a waiting list for a long period. We decided, therefore, to continue to also treat low-risk cancer in very fit patients with a life expectancy far beyond 10 years. However, reserving surgery for patients with more aggressive tumour features will most likely reach the biggest consensus in future, as this has also been advocated recently by the European Association of Urology (EAU) [3]. Further surgical measures will be taken into consideration, such as the latest EAU Robotic Urology Section guidelines, advocating the reduction of potentially contagious airborne viral particles within the operating room [6].

In conclusion, during the early phase of the COVID-19 pandemic, we experienced favourable outcomes for our patients, without having performed rigorous screening, apart from taking a thorough patient history, and by applying strict protective hygiene standards. Nevertheless, we would like to distance ourselves from a general recommendation to commence surgery in other institutions or countries despite our favourable data. We hope, however, that our data contribute to a constructive discussion on possible future strategies within the medical community.

## Acknowledgements

We would like to thank all institutions involved which have enabled the MK to provide the necessary care to our cancer patients during the COVID-19 pandemic.

## Conflicts of Interest

None declared.

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Abbreviations: EAU, European Association of Urology; ICU, intensive care unit; IQR, interquartile range; MK, Martini-Klinik Prostate Cancer Centre; PCa, prostate cancer; RKI, Robert-Koch Institute; UHH, University Hospital Hamburg-Eppendorf.

## Supporting Information

Additional Supporting Information may be found in the online version of this article:

**Appendix S1.** Martini-Klinik routines for assessment of possible COVID-19 related symptoms.