



# Timing and delay of radical prostatectomy do not lead to adverse oncologic outcomes: results from a large European cohort at the times of COVID-19 pandemic

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## Abstract

**Purpose** The current COVID-19 pandemic is transforming our urologic practice and most urologic societies recommend to defer any surgical treatment for prostate cancer (PCa) patients. It is unclear whether a delay between diagnosis and surgical management (i.e., surgical delay) may have a detrimental effect on oncologic outcomes of PCa patients. The aim of the study was to assess the impact of surgical delay on oncologic outcomes.

**Methods** Data of 926 men undergoing radical prostatectomy across Europe for intermediate and high-risk PCa according to EAU classification were identified. Multivariable analysis using binary logistic regression and Cox proportional hazard model tested association between surgical delay and upgrading on final pathology, lymph-node invasion (LNI), pathological locally advanced disease (pT3–4 and/or pN1), need for adjuvant therapy, and biochemical recurrence. Kaplan–Meier analysis was used to estimate BCR-free survival after surgery as a function of surgical delay using a 3 month cut-off.

**Results** Median follow-up and surgical delay were 26 months (IQR 10–40) and 3 months (IQR 2–5), respectively. We did not find any significant association between surgical delay and oncologic outcomes when adjusted to pre- and post-operative variables. The lack of such association was observed across EAU risk categories.

**Conclusion** Delay of several months did not appear to adversely impact oncologic results for intermediate and high-risk PCa, and support an attitude of deferring surgery in line with the current recommendation of urologic societies.

**Keywords** Prostate cancer · Delay · COVID-19 · Biochemical recurrence · Oncologic outcomes

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## Introduction

The COVID-19 pandemic is raging worldwide, with a consequent major modification of our clinical practice as urologists [1]. This is an unprecedented scenario to which our society was not prepared. While the majority of oncologic surgeries have maintained priority worldwide, most urologic associations have recommended to defer prostate cancer (PCa) surgeries [2–4]. This is based on several retrospective studies reporting the absence of poor oncologic results for PCa no matter the delay between diagnosis and surgery, although high-risk patients could be potentially at risk of higher risk of biochemical recurrence when the surgery was delayed [5–12].

A safe and efficacious timing of surgery for PCa is relevant also outside the context of the current pandemic: it is within the patient's right to be fully informed of the repercussions of delaying definitive surgical treatment. In fact, many patients seek a second opinion, make own research, and need family reconciliation before taking a decision on treatment [13–15]. Moreover, the diagnostic pathway has evolved with time-consuming supplementary exams and imaging modalities (i.e., genetic assessment, multiparametric magnetic resonance imaging, and PET/CT) which are not readily accessible and could impact treatment delay [16].

We herein analyze a large contemporary series of patients harboring intermediate and high-risk PCa according to EAU classification diagnosed on MRI-targeted biopsy and operated across Europe with various delays, exploring the impact of time to surgery on oncologic results.

## Materials and methods

After obtaining institutional review board approval, data were retrospectively gathered between March 2012 and September 2019 on 1139 patients undergoing radical prostatectomy for localized intermediate- and high-risk PCa according to EAU classification across European centers (Belgium, France, Switzerland, and Italy) [17]. All patients had prebiopsy positive mp-MRI (PI-RADS score  $\geq 3$ ) followed by MRI/US fusion targeted and systematic biopsies using the KOELIS system (KOELIS, La Tronche, France). No patient received neoadjuvant therapy in the 12 months preceding surgery. Pelvic lymph-node dissection was conducted at the surgeon discretion according to preoperative assessment of lymph-node invasion (LNI)-risk (generally with Briganti 2012 or MSKCC

nomograms), including the same lymph-node template in all patients. Adjuvant therapy was administered to patients with adverse pathologic features within 6 months from prostatectomy after multi-disciplinary oncologic meeting. Biochemical recurrence (BCR) was defined as two consecutive PSA of  $\geq 0.2$  ng/ml after undetectable values. Patients were categorized according to EAU risk categories and time between diagnosis on biopsy and surgery (i.e., surgical delay) was tested as a continuous variable [18]. Multivariable logistic regressions were performed to explore potential associations between surgical delay and upgrading on final pathology, LNI, pathological locally advanced disease (pT3–4 and/or pN1), and need for adjuvant therapy. Similarly, multivariable analysis using Cox proportional hazards model was performed to test association between surgical delay and risk of BCR. A 3 month delay was previously described as a potential cut-off for conducting surgery with a higher risk of BCR rates described [5, 9]. Therefore, Kaplan–Meier curves and log-rank test were conducted to estimate BCR-free survival as a function of surgical delay using this cut-off.

## Results

Overall, 926 patients with complete data were included in the final analysis. General characteristics of the overall cohort and among EAU risk categories are available in Table 1. Median time between diagnosis and surgery was 3 months (2–5) and distribution of this delay is shown in Fig. 1. Median preoperative PSA was 8.2 ng/ml (5–12) and pathologic analysis revealed pT2, pT3a, and pT3b–4 stages in 53.9% (499/926), 30.8% (285/926), and 15.2% (141/926) respectively. Upgrading at final pathology was present in 22.7% (210/926), LNI in 9.9% (92/926), and pathological locally advanced disease in 46.9% (434/926), and BCR was detected in 8.7% (81/926) of patients.

On multivariable analysis (Table 2), surgical delay was not significantly associated with upgrading on final specimen (OR 0.98, 95% CI 0.94–1.02,  $p = 0.3$ ), nor to LNI (OR 0.88, 95% CI 0.77–1.01,  $p = 0.07$ ), pathological locally advanced disease (OR 1, 95% CI 0.97–1.03,  $p = 0.8$ ), or need for adjuvant therapy (OR 0.96, 95% CI 0.84–1.11,  $p = 0.6$ ). The absence of impact of surgical delay on such pathologic outcomes was maintained in EAU risk categories. When exploring the impact of surgical delay on BCR (HR 0.97, 95% CI 0.91–1.04,  $p = 0.6$ ), we did not detect any significant association across both the overall population and within the risk groups. No significant difference in terms of BCR-free survival was found when a 3 month cut-off was used (all log-rank test  $p > 0.5$ ) (Fig. 2).

**Table 1** Baseline demographic and pathological characteristics

Variable	Overall ( <i>n</i> = 926)	Intermediate risk ( <i>n</i> = 623)	High risk ( <i>n</i> = 303)	<i>p</i> *
Median age at surgery, year (IQR)	66 (61–70)	65 (60–70)	62 (57–70)	0.001
Median preoperative PSA, ng/ml (IQR)	8.2 (5–12)	7.7 (5.6–10.9)	10 (7–20)	< 0.001
Clinical stage at DRE, <i>n</i> (%)				
T1	527 (56.9)	386 (62)	141 (46.5)	< 0.001
T2	351 (37.9)	213 (34.2)	138 (45.5)	
T3	18 (1.9)	0 (0)	18 (5.9)	
Unknown	30 (3.2)	24 (3.8)	6 (2)	
PI-RADS score of index lesion, <i>n</i> (%)				
3	117 (12.6)	98 (15.7)	19 (6.3)	< 0.001
4	440 (47.5)	323 (51.8)	117 (38.6)	
5	345 (37.3)	186 (29.8)	159 (52.5)	
Unknown	24 (2.6)	16 (2.6)	8 (2.6)	
Median maximum lesion diameter, mm (IQR)	12 (10–16)	11 (9–15)	14 (11–20)	< 0.001
Clinical stage on MRI, <i>n</i> (%)	6			
T2	750 (81)	611 (98.1)	139 (45.9)	< 0.001
T3a	116 (12.5)	0 (0)	116 (38.3)	
T3b	37 (4)	0 (0)	37 (12.2)	
Unknown	23 (2.5)	12 (1.9)	11 (3.6)	
Median no. of systematic cores taken, <i>n</i> (IQR)	12 (9–13)	11 (8–12)	12 (10–14)	0.1
Median no. of positive systematic cores taken, <i>n</i> (IQR)	3 (1–5)	2 (1–4)	4 (1–6)	< 0.001
ISUP grade group on systematic biopsy, <i>n</i> (%)				
0	127 (13.7)	83 (13.3)	44 (14.5)	< 0.001
1	166 (17.9)	125 (20.1)	41 (13.5)	
2	359 (38.8)	292 (46.9)	67 (22.1)	
3	148 (16)	100 (16)	48 (15.8)	
4	78 (8.4)	8 (1.3)	70 (23.1)	
5	30 (3.2)	0 (0)	30 (10)	
Unknown	18 (1.9)	15 (2.4)	3 (1)	
Median no. of targeted cores taken, <i>n</i> (IQR)	4 (2–6)	4 (2–6)	4 (2–5)	0.03
Median no. of positive targeted cores taken, <i>n</i> (IQR)	2 (2–4)	2 (1–4)	2 (2–4)	< 0.001
ISUP grade group on targeted biopsy, <i>n</i> (%)				
0	83 (9)	67 (10.7)	16 (5.3)	< 0.001
1	82 (8.8)	63 (10.1)	19 (6.3)	
2	402 (43.4)	333 (53.4)	69 (22.8)	
3	215 (23.1)	154 (24.7)	61 (20.1)	
4	104 (11.2)	6 (1)	98 (32.3)	
5	40 (4.3)	0 (0)	40 (13.2)	
ISUP grade group on final specimen, <i>n</i> (%)				
1	29 (3.1)	25 (4)	4 (1.3)	< 0.001
2	432 (46.6)	352 (56.5)	80 (26.4)	
3	347 (37.5)	225 (36.1)	122 (40.3)	
4	56 (6)	14 (2.2)	42 (13.9)	
5	62 (6.7)	7 (1.1)	55 (18.1)	
Median time between diagnosis and surgery, mo (IQR)	3.3 (2.3–4.7)	3.5 (2.4–5)	2.8 (1.9–4.1)	< 0.001
Pathologic stage, <i>n</i> (%)				
pT2	499 (53.9)	402 (64.5)	97 (32)	< 0.001
pT3a	285 (30.8)	166 (26.6)	119 (39.3)	
pT3b	141 (15.2)	55 (9)	86 (28.4)	
pT4	1 (0)	0 (0)	1 (0.3)	

**Table 1** (continued)

Variable	Overall (n=926)	Intermediate risk (n=623)	High risk (n=303)	p*
Positive surgical margin, n (%)	230 (24.8)	128 (20.5)	102 (33.7)	<0.001
Median no. of lymph node removed, n (IQR)	13 (8–18)	13 (8–17)	14 (9–19)	0.006
Lymph-node status, n (%)				
N0/Nx	834 (90.1)	595 (95.5)	239 (78.9)	<0.001
N1	92 (9.9)	28 (4.5)	64 (21.1)	
Upgrading at final pathology, n (%)	210 (22.7)	150 (24.1)	60 (19.8)	<0.001
Locally advanced disease at final pathology <sup>a</sup> , n (%)	434 (46.9)	226 (36.3)	208 (68.6)	<0.001
Biochemical recurrence <sup>b</sup> , n (%)	81 (8.7)	42 (6.7)	39 (12.9)	<0.001
Median follow-up from RP, mo (IQR)	26.4 (10–39.7)	26.2 (10–39)	26 (10–41.1)	0.8

Pathological locally advanced =  $\geq$  pT3 and/or pN1

Upgrading = higher ISUP GG at final pathology

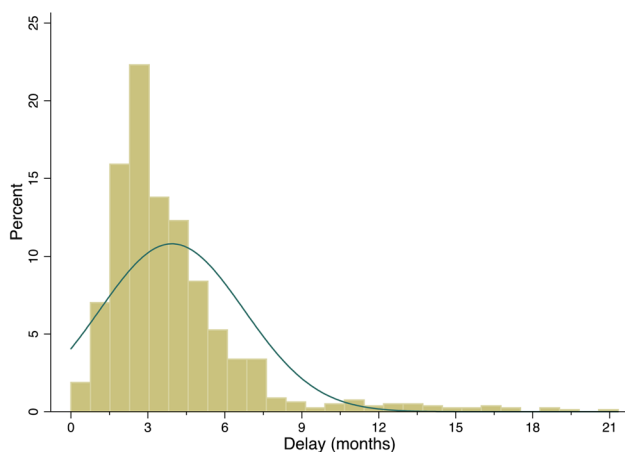
BCR = two consecutive PSA > 0.2 ng/ml

IQR interquartile range, PSA prostate-specific antigen, DRE digital rectal examination, MRI magnetic resonance imaging, data PI-RADS prostate imaging-reporting and system, RP radical prostatectomy, ISUP International Society of Urological Pathology, BCR biochemical recurrence

<sup>a</sup>Defined as  $\geq$  pT3 and/or pN1

<sup>b</sup>Defined as two consecutive PSA  $\geq$  0.2 ng/ml after undetectable values

\*Kruskal–Wallis and Chi-square tests for continuous and categorical data, respectively



**Fig. 1** Histogram of the interval of time from diagnosis to surgery

## Discussion

We herein report results from a contemporary cohort of PCa patients, finding no evidence of a negative association between delay and oncologic outcomes of radical prostatectomy. Our results confirm the findings from John's Hopkins analyzing 2303 patients who were operated within 6 months from diagnosis [6]. The authors detected no difference in BCR and metastatic-free survival rates as a function of time to surgery, which has supported the current NCCN statement regarding PCa management and deferral during COVID-19 pandemic [4]. Other

investigators have reported contrasting results in particular for high-risk patients. A review published by van den Bergh et al. evaluated 17 retrospective study and concluded that only limited data support an adversely impact of surgical delay for patient harboring intermediate and high-risk PCa [5]. More recently, Zanaty et al. retrospectively analyzed 619 men undergoing robotic-assisted prostatectomy, with mean surgical delays of 5 months. While surgical delay did not impact BCR in low-risk (HR 0.96, 95% CI 0.91–1.01,  $p=0.086$ ) and intermediate-risk (HR 1.00, 95% CI 1.00–1.01,  $p=0.99$ ) groups, and in high-risk patients (HR 1.02, 95% CI 1.01–1.03,  $p=0.001$ ), a significant association between surgical delay and BCR was detected on Cox multivariable analysis [11]. Similarly, Fossati et al. published results from San Raffaele hospital in Milan in 2653 men [12]. In high-risk patients, time to surgery was significantly associated with BCR (HR 1.02, 95% CI 1.01–1.03,  $p=0.0005$ ) and clinical recurrence (HR 1.03, 95% CI 1.01–1.04,  $p=0.0002$ ), in particular for patients waiting 12 months before undergoing radical prostatectomy. Given those results, the EAU Guidelines Office Rapid Reaction Group (GORRG) recommended to postpone all deferrable surgery until after pandemic, which included most PCa patients [3].

Some factors could influence the absence of impact of surgical delay in high-risk patient when compared to previously published study. As an example, cohort analyzed by Fossati et al. apparently harbored more cT3 (56% vs. 5.9%) and lymph-node invasion (31% vs. 21.1%) but relatively close values regarding pre- and post-operative data

**Table 2** Multivariable analysis using binary logistic regression and Cox proportional hazard model tested surgical delay in predicting the risk of upgrading, lymph-node invasion, locally advance disease, adjuvant therapy, or biochemical-failure

Variables	Overall population		Intermediate-risk		High-risk	
	OR (95% CI)	<i>p</i> value	OR (95% CI)	<i>p</i> value	OR (95% CI)	<i>p</i> value
<b>Upgrading</b>						
Time from diagnosis to surgery, months	0.98 (0.94–1.02)	0.3	0.98 (0.94–1.02)	0.4	0.94 (0.8–1.09)	0.4
PSA at biopsy, ng/ml	1.04 (1–1.08)	0.04	1.07 (1.01–1.14)	0.02	1.03 (0.97–1.1)	0.3
Clinical stage on MRI						
T2	1.0 (reference)	–	1.0 (reference)	–	1.0 (reference)	–
T3a	0.77 (0.37–1.59)	0.48	–	–	1.08 (0.34–3.44)	0.9
T3b	2.59 (0.66–10.22)	0.17	–	–	3.72 (0.76–18.25)	0.1
ISUP grade group on biopsy						
1	1.0 (reference)	–	1.0 (reference)	–	1.0 (reference)	–
2	0.17 (0.08–0.39)	<0.001	0.16 (0.06–0.45)	<0.001	0.24 (0.06–1.03)	0.055
3	0.03 (0.01–0.07)	<0.001	0.02 (0.01–0.08)	<0.001	0.03 (0.01–0.24)	0.001
4	0.03 (0.01–0.11)	<0.001	–	–	0.06 (0.01–0.31)	0.001
5	–	–	–	–	–	–
<b>Lymph-node invasion</b>						
Time from diagnosis to surgery, months	0.88 (0.77–1.01)	0.07	0.88 (0.71–1.09)	0.3	0.9 (0.77–1.06)	0.2
PSA at biopsy, ng/ml	1.09 (1.04–1.3)	<0.001	1.16 (1.05–1.27)	0.003	1.04 (0.99–1.09)	0.1
Clinical stage on MRI						
T2	1.0 (reference)	–	1.0 (reference)	–	1.0 (reference)	–
T3a	0.83 (0.33–2.07)	0.7	–	–	0.45 (0.16–1.22)	0.1
T3b	3.15 (0.91–10.85)	0.07	–	–	1.82 (0.53–6.26)	0.3
ISUP grade group on biopsy						
1	1.0 (reference)	–	1.0 (reference)	–	1.0 (reference)	–
2	1.74 (0.21–14.24)	0.6	0.28 (0.11–0.67)	0.005	0.94 (0.09–9.92)	0.9
3	7.03 (0.9–55.1)	0.06	–	–	3.87 (0.41–36.72)	0.2
4	2.74 (0.31–24.25)	0.4	–	–	0.71 (0.07–7.22)	0.8
5	30.89 (3.52–270.78)	0.002	–	–	8.08 (0.84–77.82)	0.07
<b>Locally advance disease<sup>a</sup></b>						
Time from diagnosis to surgery, months	1 (0.97–1.03)	0.8	1 (0.96–1.03)	0.8	1.07 (0.96–1.21)	0.2
PSA at biopsy, ng/ml	1.06 (1.03–1.1)	<0.001	1.07 (1.02–1.12)	0.008	1.04 (0.99–1.09)	0.1
Clinical stage on MRI						
T2	1.0 (reference)	–	1.0 (reference)	–	1.0 (reference)	–
T3a	2.55 (1.52–4.28)	<0.001	–	–	1.63 (0.77–3.45)	0.2
T3b	8.47 (1.83–39.21)	0.006	–	–	5.33 (1.09–26.09)	0.04
ISUP grade group on biopsy						
1	1.0 (reference)	–	1.0 (reference)	–	1.0 (reference)	–
2	2.9 (1.21–6.95)	0.02	4.4 (1.23–15.66)	0.02	2.29 (0.56–9.41)	0.2
3	4.43 (1.82–10.79)	0.001	7.39 (2.05–26.58)	0.002	1.94 (0.45–8.32)	0.4
4	5.46 (2.11–14.16)	<0.001	–	–	2.31 (0.55–9.63)	0.2
5	22.61 (5.71–89.43)	<0.001	–	–	9.36 (1.65–53.05)	0.01
<b>Adjuvant therapy<sup>b</sup></b>						
Time from diagnosis to surgery, months	0.96 (0.84–1.11)	0.6	0.79 (0.57–1.1)	0.2	1.01 (0.9–1.14)	0.9
ISUP grade group on final specimen						
1	1.0 (reference)	–	1.0 (reference)	–	1.0 (reference)	–
2	1.37 (0.13–13.82)	0.8	0.13 (0.02–0.81)	0.03	0.49 (0.02–9.94)	0.6

**Table 2** (continued)

Variables	Overall population		Intermediate-risk		High-risk	
	OR (95% CI)	<i>p</i> value	OR (95% CI)	<i>p</i> value	OR (95% CI)	<i>p</i> value
3	2.93 (0.3–28.78)	0.4	0.36 (0.06–2.13)	0.3	0.71 (0.04–12.88)	0.8
4	3.52 (0.32–38.2)	0.3	–	–	0.79 (0.04–15.04)	0.9
5	2.16 (0.17–27.04)	0.5	–	–	0.74 (0.04–14.77)	0.8
Pathologic stage						
pT2	1.0 (reference)	–	1.0 (reference)	–	1.0 (reference)	–
pT3a/b	2.52 (1.27–5.03)	0.008	2.2 (0.84–5.71)	0.1	2.91 (0.96–8.81)	0.06
Lymph-node involvement						
pN0 and/or pNx	1.0 (reference)	–	1.0 (reference)	–	1.0 (reference)	–
pN1	12.75 (4.88–33.3)	<0.001	26.57 (5.34–132.25)	<0.001	7.57 (2.27–25.25)	0.001
Positive margin						
R0	1.0 (reference)	–	1.0 (reference)	–	1.0 (reference)	–
R1	5.42 (2.8–10.49)	<0.001	6.97 (2.63–18.42)	<0.001	5.09 (1.96–13.20)	0.001
Biochemical failure <sup>c</sup>						
Time from diagnosis to surgery, months	0.97 (0.91–1.04)	0.6	0.95 (0.83–1.08)	0.4	1.06 (0.9–1.2)	0.4
ISUP grade group on final specimen						
1	1.0 (reference)	–	1.0 (reference)	–	1.0 (reference)	–
2	2.48 (0.33–18.41)	0.4	1.48 (0.19–11.29)	0.7	2.15e+8 (4.74e+7–9.78e+8)	<0.001
3	5.18 (0.71–37.84)	0.1	2.56 (0.33–19.58)	0.4	4.13e+8 (1.15e+8–1.49e+9)	<0.001
4	6.51 (0.82–51.38)	0.08	6.91 (0.67–71.62)	0.1	–	–
5	9.19 (1.15–73.36)	0.04	–	–	4.2e+8 (8.6e+7–2.05e+9)	<0.001
Pathologic stage						
pT2	1.0 (reference)	–	1.0 (reference)	–	1.0 (reference)	–
pT3a/b	1.15 (0.77–1.71)	0.5	1.27 (0.61–2.63)	0.5	0.84 (0.38–1.89)	0.7
Lymph-node involvement						
pN0 and/or pNx	1.0 (reference)	–	1.0 (reference)	–	1.0 (reference)	–
pN1	2.77 (1.6–4.82)	<0.001	2.15 (0.74–6.3)	0.2	2.69 (0.94–7.68)	0.06
Positive margin						
R0	1.0 (reference)	–	1.0 (reference)	–	1.0 (reference)	–
R1	1.55 (1–2.42)	0.05	1.82 (0.88–3.76)	0.1	1.56 (0.66–3.66)	0.3

HR hazard ratio, OR odds ratio, CI confidence interval;

<sup>a</sup>Defined as  $\geq$  pT3 and/or pN1 at final pathology

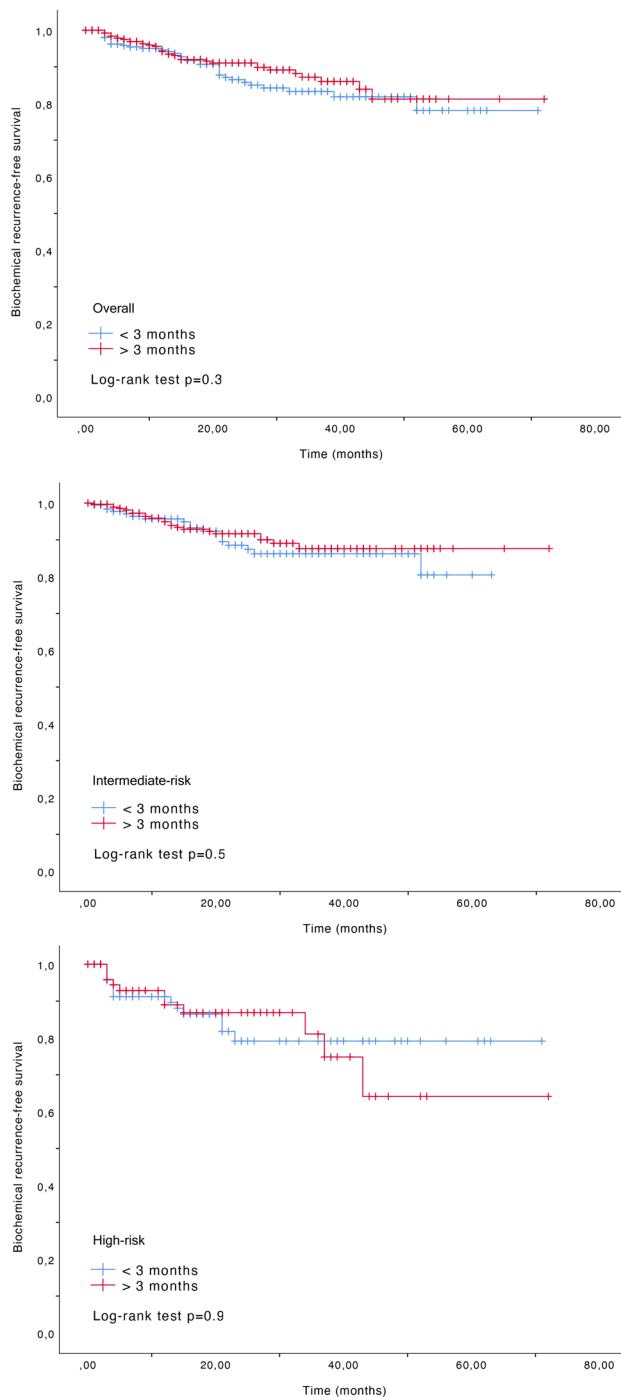
<sup>b</sup>Data available for 436 patients

<sup>c</sup>Defined as two consecutive PSA  $\geq$  0.2 ng/ml after undetectable values

[12]. Zanaty et al. described more aggressive PCa with higher ISUP grade on biopsy (84.5% vs. 33.1% for systematic biopsy and 45.4% for MRI-targeted biopsy for ISUP grade  $\geq$  4), while preoperative PSA and clinical stage seemed quite similar [11]. Consequently, these differences may have an influence on the inconsistent results regarding this subgroup of patient. Moreover, our high-risk population presented relatively low features characteristic when regarding median PSA value and clinical stage which could impact the absence of association between surgical delay and oncologic outcomes in comparison with the other studies. To note, while only 5.9% of cT3 at digital rectal examination in the subgroup of high-risk patients was observed, 50.5%

of them have an MRI showing a suspicion of extracapsular extension with or without vesicle seminal invasion. In comparison with the final pathology, a total of 68% patients harboring pT3–4 were described highlighting the importance of this preoperative imaging modality that must be read by specialized radiologists [19]. Regarding median delay between diagnosis and surgical treatment, we noted a significant difference between intermediate and high-risk patients (3.5 vs. 2.8 months,  $p < 0.001$ ) which illustrates the influence of tumor aggressiveness on faster surgical planning [13].

Strength of the present study in comparison with the previous published works is the description of a contemporary cohort using a modern diagnostic pathway (i.e., preoperative



**Fig. 2** Biochemical recurrence-free survival according to 3 month cut-off for **a** overall population, **b** intermediate-risk, and **c** high-risk patients

mp-MRI and MRI/US fusion system for targeted and systematic biopsies). This leads to an improved PCa evaluation with higher histopathology concordance and preoperative classification compared to historical series based on transrectal ultrasound biopsy only [20]. In other words, our set of patients was probably more precisely defined thanks to these news

preoperative tools leading to fewer unexpected adverse diseases on the final specimen. We acknowledge the retrospective nature of the present analysis introducing a potential selection and confounding bias with unknown factors that led the physician to choose the most appropriate timing for surgery. However, one must bear in mind that designing a prospective trial postponing the treatment of oncologic patients is technically and ethically impossible. Using time from biopsy to surgery as a continuous variable was an arbitrary decision, although we found similar result using 3–6–9–12 months periods. In the present study, most of the men were operated within a period close to 3 months; therefore, care must be taken to the interpretation of our results for longer treatment delays. However, with regard to the results of similar studies, it seems safe to propose a delay up to 6 months for high-risk diseases since diagnosis, while surgery for low- and intermediate-risk diseases could be further delayed. Follow-up period was relatively short and could impact the number of events for biochemical recurrence especially in the intermediate-risk subgroup.

## Conclusions

In conclusion, in this large series of European men undergoing radical prostatectomy for intermediate and high-risk prostate cancer, we did not observe any significant association between surgical delay and adverse oncologic outcomes, including upgrading, pathological locally advanced disease, need for adjuvant therapy or BCR. Results were confirmed across EAU risk categories. Our data support a safely deferred approach for PCa patients awaiting surgery in this time of COVID-19 pandemic.

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## Compliance with ethical standards

**Conflict of interest** The authors certify that there is no conflict of interest with any financial organization regarding the material discussed in the manuscript.

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