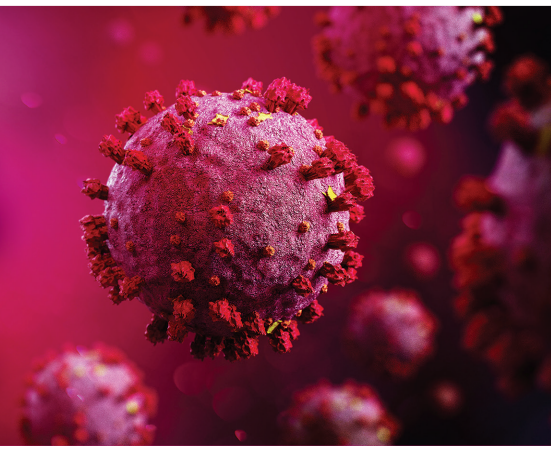
Managing Prostate Cancer Surgical Patients during the COVID-19 Pandemic: A Brief Report of the Duke Cancer Institute's Initial Experience



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PERSPECTIVE

E. David Crawford, MD, reflects on current triage challenges on page 160 and **Eric A. Klein, MD,** shares the Cleveland Clinic experience on page 163

Introduction

The coronavirus disease 2019 (COVID-19) pandemic has rapidly placed tremendous stress on health systems around the world. In response, multiple health systems have postponed elective surgeries in order to conserve hospital beds and personal protective equipment, minimize patient traffic, and prevent unnecessary utilization and exposure of health care workers.[1] The American College of Surgeons released the following statement on March 13, 2020: "Each hospital, health system and surgeon should thoughtfully review all scheduled elective procedures with a plan to minimize, postpone, or cancel electively scheduled operations, endoscopies or other invasive procedures until we have passed the predicted inflection point in the exposure graph and can be confident that our health care infrastructure can support a potentially rapid and overwhelming uptick in critical patient care needs."[2] In our state, North Carolina, Governor Roy Cooper requested that all hospitals postpone elective and nonurgent procedures and surgeries effective March 23, 2020.

Aside from clear-cut examples of immediately life-threatening versus truly elective cases, most procedures exist on a continuum of potential harm that may result from postponing surgical treatment. This is particularly germane to surgeries for cancer, in which long-term outcomes are often dependent on timely intervention. In urology, considerations regarding case stratification have been published to help guide our review processes.[3-5] However, ultimately, this process needs to be customized to the level of COVID-19 severity in each region. The goal is to remain vigilant and prepared for the population-level risk of COVID-19, but to reasonably ration available resources to treat non–COVID-19 diseases that threaten our patients.

In North Carolina, testing-confirmed COVID-19 case numbers and hospital resources are illustrated in the **Figure**. At this point (as of April 9, 2020), case numbers in North Carolina are rising but lag behind those of the main US epicenters; hospital resources remain relatively well preserved.

Within this current COVID-19 environment, we outline our approach to stratifying surgical management of prostate cancer here at Duke University Hospital.

Prostate Cancer

The diagnosis and management of adenocarcinoma of the prostate, or prostate cancer (PC), have been and remain controversial during the best of times, but the COVID-19 pandemic certainly adds fuel to the fire. Providing safe and appropriate care requires a nuanced approach. Fortunately, risk stratification of the severity of localized and advanced PC has been in practice for many years and is being used now to its full extent to triage prostate cancer patients for surgical care.

Traditionally, PC had been placed into 3 risk groups as defined by D'Amico et al: low, intermediate, and high risk. These were later adopted by major professional organizations, including the American Urological Association, National Comprehensive Cancer Network, and American Society of Clinical Oncolo-

gy.[6-9] These organizations have relied on American Joint Committee for Cancer for the backbone stage groups[10] In 2020, most experts use a classification of 5 risk groups for localized prostate cancer (**Table 1**). The boxed areas are the two highest categories of high and very high risk disease. Men in these two groups at our center have been considered to move forward with scheduled surgery during the COVID-19 pandemic subject to local hospital considerations regarding the severity of COVID and would be the first patients to be rescheduled for surgery once the COVID pandemic subsides. In our risk schema, we have reverted to the traditional 3 risk group system collapsing very low and low risk and combining high and very high risk.

The staffs of the Duke Cancer Institute Center for Prostate and Urologic Cancers, working with the Duke Cancer Center's surgeon-in-chief and his office, developed a COVID-19 triage table (**Table 2**) to help our teams make prudent and consistent decisions about prostate cancer surgeries during the pandemic surge for as long as local conditions dictate. This schema also stratifies patients for clinic visits and procedures. Currently, our timelines for care are:

- Priority 3: See/do now
- Priority 2: Delay 6-12 weeks
- Priority 1: Delay 3-6 months

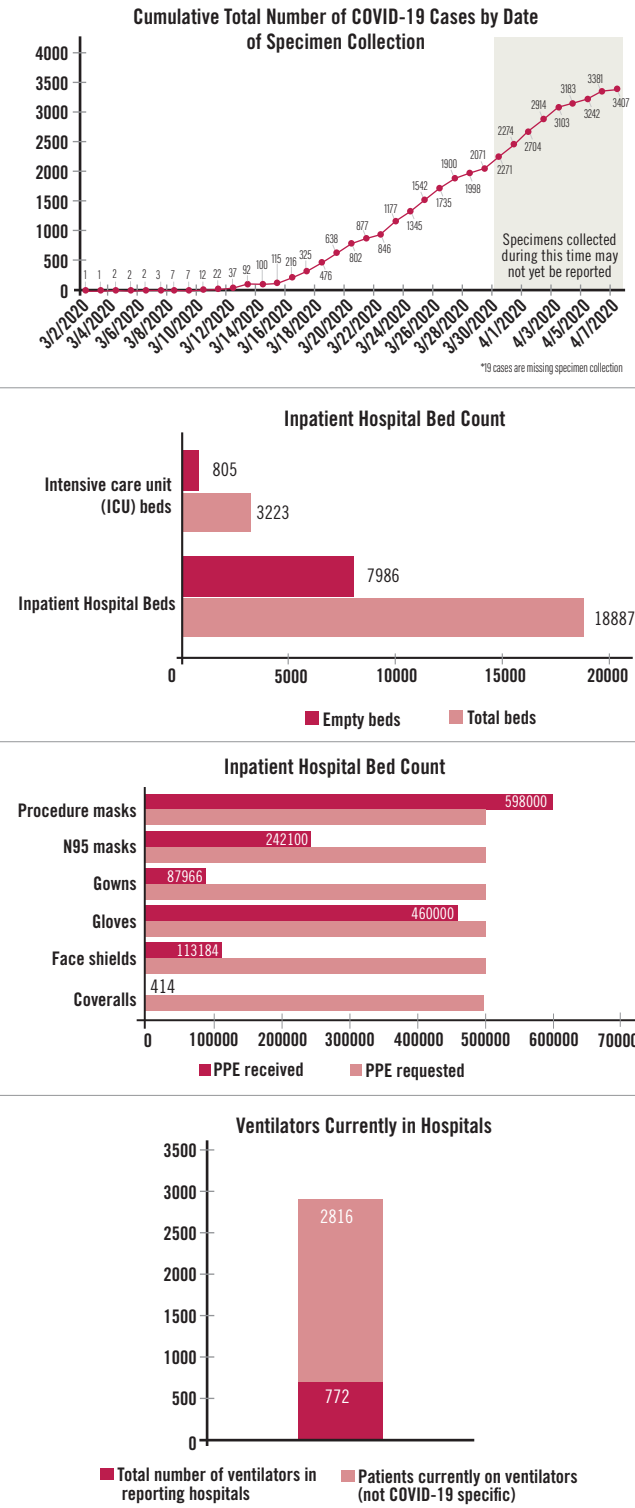
Importantly, when this is communicated to patients, it must be made clear that these timelines are approximate and likely will change. If COVID-19 worsens, the timelines will shift to incorporate significantly longer delays.

To further illustrate the process for triage of localized prostate cancer at our center, we offer several specific surgery case examples. With these, we hope to help practicing urologic oncologists to make triage and treatment recommendations for their patients.

Cases

CASE 1. involves a high-risk 62-year-old African American man with a pros-

FIGURE COVID-19 data obtained online via the North Carolina Electronic Disease Surveillance System

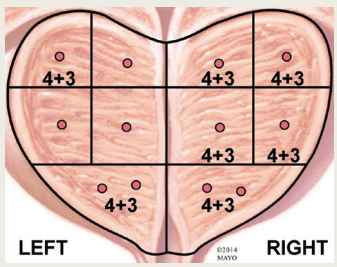


Source: North Carolina Center for Health Statistics (2020). (https://www.ncdhhs.gov/), last updated April 8, 2020; **KEY:** COVID-19, the coronavirus 2019; PPE, personal protection equipment.

TABLE 1. **Risk Groups- Five Current Groups for Localized Prostate Cancer**

Risk Group[1]: Clinically Localized	
Very low risk	T1c: Gleason score ≤6; PSA < 10 ng/mL ; Fewer than 3 prostate biopsy cores positive, ≤50% cancer in each core; PSA density < 0.15 ng/mL/g
Low risk	T1-T2a; Gleason score ≤6; PSA <10 ng/ML
Intermediate risk	T2b-T2c or Gleason score 7 or PSA 10-20 ng/mL
High risk	T3a or Gleason score 8-10 or PSA >20 ng/mL
Very high risk	T3b-T4 or Primary Gleason pattern 5 or >4 cores with Gleason score 8-10
Risk Group[1]: Metastatic	
Any T, N1, M0; Any T, Any N, M1	

CASE 1 High Risk: Postpone due to COVID-19; Placed on ADT

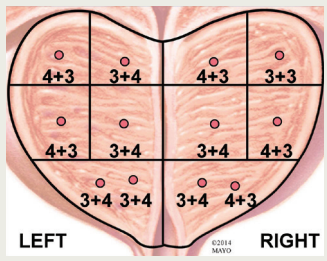


62 y AA M- Gleason 4+3 PC. +PNI bilaterally. PSA 28. cT2a.

- AUA-SS 23, BI 5, IIEF 17
- **IMAGING:** MRI 111 cc, PI-RADS 4 lesion involving bilateral posterior medial apex; BS negative
- **PMH:** BMI 29, HTN
- **PSH:** bladder repair, open right hernia repair with right orchiectomy
- **FH:** None pertinent

KEY: AA, African American; ADT, androgen deprivation therapy; AUA-SS, American Urological Association Symptom Score; BI, other index; BMI, body mass index; BS, bone scintigraphy; COVID-19, coronavirus 2019; cT2a, clinical stage T2a; FH, family history; IIEF, International Index of Erectile Dysfunction; HTN, hypertension; M, male; PC. prostate cancer; PI-RADS, Prostate Imaging Reporting and Data System; PMH, past medical history; PNI, perineural invasion; PSA, prostate-specific antigen; PSH, past surgical history; y, years.

CASE 2 High Risk: Postponed Due to COVID-19; Placed on ADT



62 y AA M- Gleason 4+3 PC. +PNI bilaterally. PSA 44. cT3a.

- AUA-SS 7, BI 2, IIEF 6
- **IMAGING:** TRUSS 39 cc. CT, BS negative
- **PMH:** BMI 24, HLD, NIDDM
- **PSH:** Lab umbilical hernia repair
- **FH:** None pertinent

KEY: AA, African American; ADT, androgen deprivation therapy; AUA-SS, American Urological Association Symptom Score; BI, bother index; BMI, body mass index; BS, bone scintigraphy; COVID-19, coronavirus 2019; cT3a, clinical stage T3a; FH, family history; HLD, hyperlipidemia; IIEF, International Index of Erectile Dysfunction; M, man; NIDDM, non-insulin-dependent diabetes mellitus; PC, prostate cancer; PMH, past medical history; PNI, perineural invasion; PSA, prostate-specific antigen; PSH, past surgical history; TRUS, transrectal ultrasonography; y, years.

tate-specific antigen (PSA) measurement higher than 20. We contemplated moving forward with his case but instead decided to postpone surgery and start androgen deprivation therapy (ADT) with leuprolide at a 45-mg 6-month depot dose. This decision was due to several factors, including his very large prostate gland (measuring more than 100 cc), the possibility of a narrow pelvis due to his ethnicity, and prior pelvic surgery. We surmised that his case, as treated at our center, could be more difficult as compared with an average overnight admission for open or robotic radical prostatectomy (RP), with potentially more bleeding and more use of health care resources. Based on the literature about the use of neoadjuvant ADT, we felt that this course of action would have a low probability of harm and would also decrease his prostate size, making future surgery potentially less morbid. Based on work from Gleave et al in a Canadian randomized controlled trial, we will continue the ADT for at least 3 months and reevaluate him for RP at that time.[11]

Under normal conditions, we generally do not administer neoadjuvant ADT to RP patients because of the lack of a proven survival benefit.[12,13] However, during COVID-19, we are trying to alleviate harm from delaying surgery, and prior trials did show that taking the time to prescribe hormonal therapy did not lessen survival versus proceeding directly to surgery.

CASE 2. Here, an African American male aged 64 years has high-volume grade group 2 and 3 PC, a PSA of 44, and clinical stage T2a disease. As such, he is classified as high risk. We elected to postpone his surgery in part because he also has uncontrolled diabetes, and we had concern that proceeding to RP during this pandemic could have led to excess hospitalization and use of excess health care resources. We also elected to start neoadjuvant ADT, a more controversial decision in this case because the hormonal therapy could make diabetes control more challenging. In the

TABLE 2. **Duke University Triage of Prostate Cancer During COVID-19 Outbreak (Version 1 April 6, 2020)**

		Priority Level (CMS and ACS)		
		3 (highest priority)	**2 (intermediate priority)**	**1 (low priority)**
Prostate	New consults	High risk (Gleason 8+, T3, PSA >20) Bad histology (eg small cell)	Intermediate risk (Gleason 7, T2, PSA 10-20)	Low risk (Gleason 1, T1c, PSA <10)
	Follow-ups	Postop complications RP high risk, <3 m	RP high risk, 3-12m	RP high risk, >1y; RP intermediate or low risk
	Biopsy	High risk	Intermediate risk	Low risk; Active surveillance
	Surgery	High risk and >6-month wait Small cell	High risk and <6-month wait; Intermediate risk and >6-month wait	Intermediate risk and <6-month wait; low risk

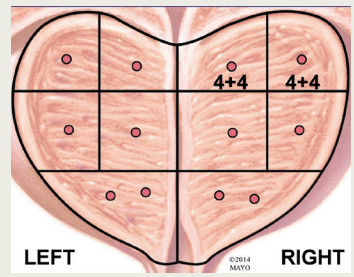
KEY: COVID-19, coronavirus disease 2019; PSA, prostate specific antigen; RP, radical prostatectomy

end, however, we felt that the high-volume cancer should be controlled without delay; we also took into consideration that the patient might ultimately favor radiation over surgery. Some experts could argue that we should postpone this case for only 30 days and hold off on use of ADT. However, the current uncertainty of the COVID-19 peak and the potential need to use excess health care resources in the perioperative period for this patient prompted us to make the case management decisions described above.

CASE 3. This case involves a very healthy African American man, aged 61 years, with Gleason 4+4=8 in only 2 cores but with a PSA higher than 30. Because he was in excellent health and had high-risk disease, he was deemed appropriate for surgery based on day-to-day conditions at our center. He was negative for COVID-19 based on a test performed 72 hours before surgery at our drive-through testing site. (As of early April 2020, our health system requires preoperative COVID-19 testing for all scheduled surgery patients, performed at our center; we currently do not allow testing outside of our own health system.)

To not overutilize health care resources, we performed only a unilateral right-side

CASE 3 **High Risk:** Recommended to Proceed to RP

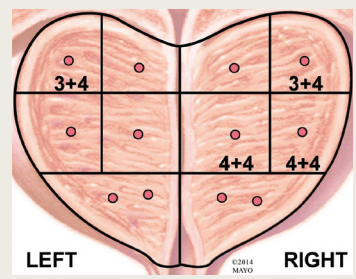


61 y AA M- Gleason 4+4 PC. +PNI. PSA 36. cT1c.

- AUA-SS 3, BI 1, IIEF 20
- **IMAGING:** TRUS 31 cc. CT, BS negative
- **PMH:** BMI 29, kidney cancer, NIDDM
- **PSH:** Right nephrectomy
- **FH:** None pertinent

KEY: AA, African American; AUA-SS, American Urological Association Symptom Score; BI, bother index; BMI, body mass index; BS, bone scintigraphy; COVID-19, coronavirus 2019; cT1c, clinical stage T1c; FH, family history; Hx, history; IIEF, International Index of Erectile Dysfunction; M, male; PC, prostate cancer; PMH, past medical history; PNI, perineural invasion; PSA, prostate-specific antigen; PSH, past surgical history; RP, radical prostatectomy; TRUS, transrectal ultrasonography; y, years.

CASE 4 **High Risk:** Recommended to Proceed to RP



58 y Caucasian M- Gleason 4+4 PC. PSA 22. cT2c.

- AUA-SS 2, BI 1, IIEF 20
- **IMAGING:** TRUS 70 cc. MRI with PI-RADS 5 at right apex. BS negative.
- **PMH:** BMI 27, nephrolithiasis
- **PSH:** None
- **FH:** Bladder cancer (father)

KEY: AUA-SS, American Urological Association Symptom Score; BI, bother index; BMI, body mass index; BS, bone scintigraphy; cT2c, clinical stage T2c; FH, family history; IIEF, International Index of Erectile Dysfunction; M, male; PC, prostate cancer; PMH, past medical history; PI-RADS, Prostate Imaging Reporting and Data System; PSA, prostate-specific antigen; PSH, past surgical history; RP, radical prostatectomy; TRUS, transrectal ultrasonography; y, years.

PERSPECTIVE BY

E. David Crawford, MD

Challenges of Surgical and Radiotherapy Triage

Judd Moul, MD, FACS harnesses his prior military experience and uses this knowledge in concert with his colleagues at Duke to provide risk stratification in order to triage the care of men with prostate cancer during this current pandemic. As he points out the treatment of all stages of prostate cancer, particularly early prostate cancer remains controversial. The current challenges and limitations of care posed by the COVID-19 pandemic has further highlighted these controversies.

There are a number of different stratifications for prostate cancer including those from the American Urological Association, NCCN, ASCO and American joint committee for cancer. Moul and colleagues developed a triage table as described in this manuscript and then prioritized based on reducing the risk to patients and caregivers. They then focus on the process of triaging men with localized prostate cancer and provide specific case examples which are thoughtful and minimize the risk to all concerned. While the main focus of this presentation is on surgical management, radiation oncologists who also treat men with localized prostate cancer have a similar challenges. There is no question that they want to continue to provide high-level care and at the same time protect patients and healthcare providers. We are seeing a resurgence of interest higher dose shorter course methodologies such as tomotherapy and CyberKnife. In addition there is currently a tremendous interest in using brachytherapy because of recent publications substantiated the survival benefits and minimal side effects. Couple this with the ease of delivery and limited exposure to a healthcare workers.[1,2]

I applaud Moul and his associates for educating us in this very difficult time.

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pelvic lymphadenectomy in association with the radical retropubic prostatectomy; we did not perform an extended lymph node dissection. Our reasoning was that we did not want to risk a lymphocele that would possibly increase utilization of health care resources during our upcoming COVID-19 peak.

Our enhanced recovery after surgery protocol for RP dictates the use of bupivacaine liposome injectable suspension (Exparel 266 mg/20 cc mixed with 20 cc 0.25% standard bupivacaine) in the incision on closure and use of enoxaparin sodium (Lovenox 0.4 ml/40 mg subcutaneous, daily). The upivacaine increases the probability of discharge from the hospital on postoperative day 1, which is always desirable but is even more so during the COVID-19 pandemic. The enoxaparin is for deep venous thrombosis prophylaxis, but this might also increase the risk of a lymphocele. This was our reasoning for the unilateral standard lymphadenectomy.

CASE 4. This healthy 58-year-old healthy Caucasian man with lower volume Gleason 8 prostate cancer but with a PSA level of over 20. This gentleman is a commercial pilot and was originally contacted and asked to postpone his surgery and initiate short term ADT (this was very early in our hospital preparedness where any surgery was being subject to postponement). The patient was, understandably, not keen for preoperative ADT and was concerned that use of ADT may lengthen his return to flight status with the Federal Aviation Administration (FAA). Ultimately, he was deemed high risk and was approved to move forward with radical retropubic prostatectomy and unilateral pelvic lymphadenectomy after negative COVID-19 testing.

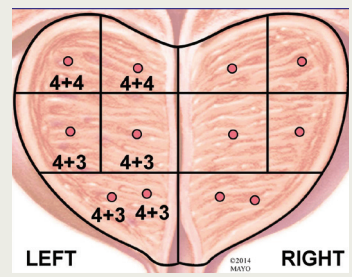
CASE 5. This Caucasian male business executive, aged 75 years, was recommended by his community urologist to undergo external beam radiotherapy and neoadjuvant hormonal therapy due to his age and morbid obesity (body mass index = 38). However, the patient was keen to have surgery instead and presented to our center for a second opinion soon before

COVID-19 arrived in our area. He was scheduled for radical retropubic prostatectomy but was very strongly encouraged to see a radiation oncologist for proper multidisciplinary education and counseling. When the COVID-19 crisis emerged, he and his local urologist were contacted by our team with our recommendation that he start leuprolide neoadjuvant hormonal therapy and then strongly consider external beam radiotherapy and not proceed to RP. The patient refused and is currently on the surgical schedule for fall 2020. This case illustrates that, even in a pandemic, we cannot force therapy decisions on patients. As of now (early April 2020), it remains unclear what management this patient will ultimately elect.

CASE 6. Prior to the pandemic, this individual with male hypogonadism and obesity, aged 62 years, was diagnosed with low-risk localized prostate cancer. He initially elected RP because he has low testosterone which, arguably, might lessen the long-term success of active surveillance and increase his risk for recurrence and unfavorable pathology. Under normal circumstances, low-risk men are asked to choose between active treatment and active surveillance, and this patient chose surgery. When COVID-19 worsened in our region and our COVID-19 surgical guidelines were announced, we contacted him to say that his surgery could be postponed up to 6 months. At that point, he agreed to active surveillance. He will have a follow-up PSA measurement and prostate examination 6 months after his biopsy date, and he may ultimately have a prostate MRI and/or repeat prostate biopsy before being reconsidered for surgery. Low-risk men, most of whom should probably be placed on active surveillance anyway, are "low-hanging fruit" during COVID-19, those in whom surgery can be postponed or avoided to help prevent overburdening the health care system during the surge.

CASE 7. A healthy Caucasian man, aged

CASE 5 High Risk: Surgery postponed; Recommended to Start DT and Consider EBRT (not RP)

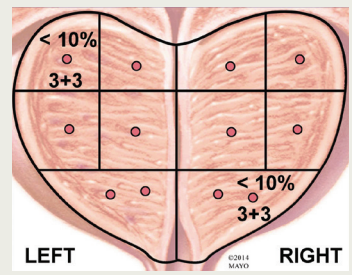


75 y Caucasian M- Gleason 4+4 PC. +PNI. PSA 14. cT1c.

- AUA-SS 10, BI 0, IIEF 17
- **IMAGING:** DRE 30 cc. CT, BS negative
- **PMH:** BMI 38, HTN, HLD, ex-smoker
- **PSH:** None
- **FH:** None pertinent

KEY: ADT, androgen deprivation therapy; AUA-SS, American Urological Association Symptom Score; BI, bother index; BMI, body mass index; BS, bone scintigraphy; cT1c, clinical stage T1c; DRE, xxx; EBRT, external beam radiation therapy; FH, family history; HLD, hyperlipidemia; HTN, hypertension; IIEF, International Index of Erectile Dysfunction; M, male; PC, prostate cancer; PMH, past medical history; PNI, perineural invasion; PSA, prostate-specific antigen; PSH, past surgical history; RP, radical prostatectomy; y, years.

CASE 6 Low Risk: Postpone RP up to 6 months or Consider Active Surveillance

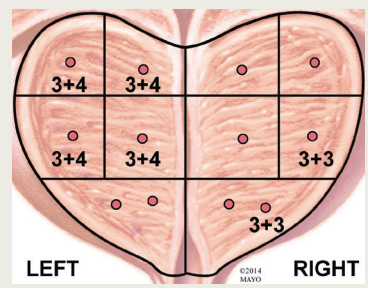


62 y Caucasian M- Gleason 3+3 PC. PSA 2. cT2a.

- AUA-SS 11, BI 4, IIEF 23
- **IMAGING:** TRUS 44 cc
- **PMH:** BMI 35, GERD, hypogonadism (on T)
- **PSH:** Lap right orchiectomy and hernia repair, cholecystectomy
- **FH:** None pertinent

KEY: AUA-SS, American Urological Association Symptom Score; BI, bother index; BMI, body mass index; cT2a, clinical stage T2a; FH, family history; GERD, gastroesophageal reflux disease; IIEF, International Index of Erectile Dysfunction; lap, laparascopic; M, male; PC, prostate cancer; PMH, past medical history; PSA, prostate-specific antigen; PSH, past surgical history; RP, radical prostatectomy; TRUS, transrectal ultrasonography; y, years.

CASE 7 Intermediate Risk: Postpone RP up to 3 months



70 y Caucasian M- Gleason 3+4 PC. PSA 7.5. cT1c.

- AUA-SS 3, BI 1, IIEF 5
- **IMAGING:** TRUS 19 cc. CT, BS negative
- **PMH:** BMI 25, NIDDM, HLD, hypothyroidism, OA
- **PSH:** None
- **FH:** None pertinent

KEY: AUA-SS, American Urological Association Symptom Score; BI, bother index; BMI, body mass index; BS, bone scintigraphy; cT1c, clinical stage T1c; FH, family history; HLD, hyperlipidemia; IIEF, International Index of Erectile Dysfunction; M, male; NIDDM, non-insulin-dependent diabetes mellitus; OA, osteoarthritis; PC, prostate cancer; PMH, past medical history; PSA, prostate-specific antigen; PSH, past surgical history; RP, radical prostatectomy; TRUS, transrectal ultrasonography; y, years.

70 years, presented to our center with Gleason 8 in 4 of 12 cores, a PSA of 7.5, and clinical stage T1c disease. He had been scheduled for RP, with a surgery date several weeks out. This date proved to coincide with the start of the COVID-19 pandemic in our area. At the time of the COVID-19 surgery postponement process for this patient, we realized that a pathology review had not yet been completed in accordance with our policy of having outside pathology slides reviewed at our center for accuracy. Interestingly, after the pathology review, the patient was downgraded to Gleason 3 + 4 = 7 in the 4 involved cores, reclassifying his risk group from high to intermediate; surgery was postponed for up to 3 months. Before the pathology review, the patient had been offered neoadjuvant ADT but declined. In retrospect, in light of the subsequent pathology downgrading, this was a wise move.

Summary

The COVID-19 pandemic scenario continues to change and vary throughout the United States and the world. Our process at Duke will undoubtedly evolve. Nevertheless, we wanted to share our initial experience with COVID-19 surgical triage with some specific examples.

Overall, healthy men with high- and very high-risk localized prostate cancer are currently proceeding to surgery, while low- and intermediate-risk men are being postponed. We have also elected to employ neoadjuvant ADT selectively in less-healthy men who may require more health care resources at a critical time when our health system is at or nearing peak COVID-19 capacity.

The COVID-19 pandemic continues to change and the crisis varies throughout the US and the world. Our process will undoubtedly evolve.

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PERSPECTIVE BY

Eric A. Klein, MD

A Rational Approach to Managing Prostate Cancer in an Irrational Time

The authors have nicely outlined the challenges that virtually all developed countries are facing during the onslaught of SARS-CoV-2. Most states have enacted temporary bans against all but essential surgeries; they have left local physicians to use their judgment to determine the meaning of "essential," considering individual threats to life, limb, and vital organ systems and progression in stage or metastasis for cancers, while ensuring the safety of patients and caregivers with respect to maintaining an adequate supply of intensive care unit (ICU) beds, ventilators, and personal protective equipment (PPE). Thus, in large measure, the definition of "essential" depends on local conditions: the incidence of infection, the capacity of the regional hospital system, the number of affected caregivers who may be temporarily out of the workforce, the daily burn rate of PPE use, and so on.

For the management of cancer in general, there are other factors to consider in deciding what is "essential," including increased potential exposure to coronavirus infection in immunocompromised patients needing to go to a treatment center for chemo- or immunotherapy; patient anxiety related to delaying initiation of or ongoing therapy; and concerns about whether delaying therapy could influence the chance for cure.

Fortunately for patients with prostate cancer, a substantial amount of evidence from vast experience with active surveillance indicates that those with very low-, low-, and intermediate-risk disease do not compromise their chance for cure by delaying curative treatment.[1] Although fewer data are available for those with high-risk (HR) and very high-risk (VHR) disease, in a recently published retrospective pooled analysis from 3 high-volume tertiary centers, we found no difference in rates of biochemical failure, metastasis, prostate-cancer–specific mortality, or all-cause mortality in those with HR or VHR disease treated <8, within 8-12, or >12 weeks after diagnosis.[2] In our observation and experience, a delay of up to 90 days for locally advanced or high-grade prostate cancer does not seem to have an adverse effect on short-term outcomes, although 1 prior report found that for HR disease, biochemical failure rates were worse for those with a delay of >90 days.[3] An alternative strategy is the use of androgen deprivation therapy as a delaying tactic, which presumably can delay the risk of tumor progression indefinitely. This is also likely safe, at least for a few months, but it's not clear if the extra cost and toxicity are worth the presumed safety margin, and there is a risk that use for as little as 24 weeks can induce genomic changes characteristic of metastatic castrate-resistant disease, which could compromise cure.[4]

At Cleveland Clinic, we have considered cancer-related and non–cancer-related factors and devised a tiered approach to performing urological surgery and office procedures **(Figure)**.[5] At the initial stage of the crisis, when the magnitude of the number and severity of SARS-CoV-2 cases was unknown, we worked with institutional leadership and the decision was made to put all tier 3 and 4 surgeries on hold. As events evolved, and it became clear that early stay-at-home orders and social distancing were effective in flattening the incidence curve in northeast Ohio and that our hospital and caregiver resources would not be overwhelmed with cases, we began (starting the week of April 20) doing tier 3 cases on a limited basis as our system ramps up again, based on availability of operating rooms and nursing and anesthesia personnel, and on patient preference. We have followed a similar process for office-based and nursing procedures. System-wide real-time information with daily monitoring of resources has allowed us to do this safely: The creation of dashboards to monitor system-wide hospitalization and ICU usage for COVID-19-related and non–COVID-19-related care and PPE usage/stock availability, along with our tiered approach to procedures, allows for a rational, measured, and real-time approach that can be dialed back or ramped up as dictated by events related to SARS-CoV-2.

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TABLE. **Cleveland Clinic Department of Urology: Recommended Surgical Priority Tiers (COVID-19)**

0 Emergency	1	2	3	4 nonessential
Obstructed kidney/ infection	Cystectomy – high risk cancer	CAP GG3-5 or GG2 with more than 2 cores or tumor length > 5 mm or Gleason 3+3 w >50% core positivity in number of cores or any PSA >10	Cystectomy – not high risk	CAP GG1 or GG2 with 2 or fewer cores of max length <5 mm
Urologic abscess/wound washout	Nephrectomy – IVC thrombus	RPLND	Partial Nx >4 cm	Partial Nx SRM
Torsion	TURBT high risk	Radical Nx	TURBT low risk	Adrenalectomy (CA not suspected) and asymptomatic
Clot retention	Stage 2 sacral neuromodulation	Adrenalectomy (cancer suspected) or symptomatic	Neurogenic cysto/ Botox	Asymptomatic non-obstructing renal stone
Hemorrhage	Orchiectomy – cancer	Urogenital/colovesical fistulas	Ureteroscopy for presumed low risk upper tract UC	Slings
Pregnant with obstruction	Nephroureterectomy	Adult ureteral reimplant or pyeloplasty	Stone with stent/ neph tube or symptomatic	Pelvic organ prolapse
Cadaveric renal tx	Penile cancer	BPH requiring indwelling catheter	Urethral diverticula	Sacral neuromodulation stage 1 or total
Urinary retention unable to place catheter	Ureteral stone	Stent change	Mesh removal/ sling incision	Artificial urethral sphincter
Penile fracture	Urethral Stricture with imminent obstruction		Ureterolysis	Penile prosthesis
Infected prosthesis/ device	Recto/pubo urethral fistula		SNM IPG change	Infertility/non cancer scrotal surgery
Priapism	Ureteroscopy for suspected high risk upper tract UC			Pediatric: reimplant, penile and benign testicular cases
				Living donor renal tx
				Vasectomy/ circumcision
				BPH on self cath or safely voiding
				Urethral stricture no imminent obstruction
				Buried penis
				Peyronies

Source: Recommendations for tiered stratification of urologic surgery urgency in the COVID-19 era. *J Urol*. Published online April, 21, 2020. **KEY:** IVC, inferior vena cava; tx, transplant

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