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Influence of the COVID-19 Pandemic Restrictions on the Incidence of Upper Tract Urothelial Cell Carcinoma: A Canadian Single-Center Experience

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Abstract

Background

The coronavirus disease 2019 (COVID-19) pandemic substantially disrupted healthcare systems worldwide and acted as a source of investigation into how oncologic care is affected during periods of significant healthcare suppression. We analyzed the impact of COVID-19-associated healthcare restrictions on wait times for the surgical resection of upper tract urothelial cell carcinoma (UTUCC) and the incidence of adverse final pathology in Newfoundland and Labrador (NL).

Methods

Retrospective chart review was performed for patients undergoing surgical management for UTUCC between January 1, 2018, and November 30, 2024, at our center. Patients were placed into three cohorts based on local healthcare-enforced restrictions: a baseline pre-pandemic phase, a phase of pandemic-related healthcare disruption, and a post-pandemic phase following the relaxation of restrictions. Wait times for surgery, final pathological stage, and clinical outcomes were analyzed across cohorts to assess for patient adversities in relation to COVID-19 healthcare restrictions.

Results

The study included 64 patients (mean age: 70.8 ± 9.7 years; 54.7% men), with no significant demographic differences across cohorts. Before the pandemic, 71.4% of patients experienced pT3 UTUCC disease on final pathology, compared with lower proportions during the pandemic (30.4%) and post-pandemic (33.3%) cohorts. Surgical wait times showed the greatest variance during the pandemic (mean: 88.7 ± 116.6 days); however, no significant differences were observed across cohorts ($p = 0.574$).

Conclusions

Despite a greater variance in operative wait times during the peak of the pandemic, we did not experience an increased incidence of adverse UTUCC pathology. Continued research is required to better define how pandemic-related healthcare disruptions impacted individual urogenital malignancies.

Categories: Urology
Keywords: coronavirus, pathological staging, surgical wait times, upper tract urothelial carcinoma, urological cancer

Introduction

The prior decade has been associated with significant improvements in survival rates for various malignancies, owing in part to earlier detection rates and timely intervention [1]. However, the coronavirus disease 2019 (COVID-19) pandemic, and associated emergency health measures, affected screening programs and accessibility to in-person care [1-3]. In efforts to prevent further viral transmission, governing bodies enforced lockdown procedures and mandated the suppression of non-COVID-19-related healthcare resources [2]. Despite such efforts, infection rates quickly overcame many healthcare capacities, thus creating further barriers to effective healthcare access and cancer care delivery [3].

The inability to seek medical attention negatively affected the diagnosis and treatment of various genitourinary (GU) malignancies, including urothelial cell carcinoma (UCC) [2,4]. The incidence of UCC is the fourth most common tumor globally, and it occurs least commonly in the upper tract [5,6]. Upper tract urothelial cell carcinoma (UTUCC) accounts for 5%-10% of UCC cases with an estimated incidence in Western countries of 2/100,000 inhabitants [6-8].

Several factors are associated with the pathogenesis of UTUCC, including tobacco exposure, the use of

aristolochic acids, and Lynch syndrome [5,7,9-11]. The diagnosis of UTUCC may occur incidentally or symptomatically, with gross hematuria being the most prevalent presenting symptom [10]. Patients discovered via symptomatic detection usually portray a poor prognosis and should be evaluated for possible metastatic disease [7]. The aggressiveness of UTUCC is evident as 66% of cases exhibit an invasive nature at the time of diagnosis [12]. Overall survival (OS) rates are dependent on the prevalence of disease-related risk factors, stage at diagnosis, the volume of disease, multifocality, and management techniques [13-15]. Five-year OS rates for early-stage UTUCC of the renal pelvis and ureter are 63% and 60%, respectively [16]. However, late presentation is common, with over 50% of patients diagnosed as stage T2 or greater [14]. Late-stage disease is associated with worse five-year OS, varying from 9% to 60% [14-16].

Previous research from our Canadian center described diagnostic and treatment delays and temporal changes in disease stage among patients with multiple genitourinary (GU) malignancies, including testicular, penile, and renal cell carcinomas (RCC) [4,17,18]. As there is a paucity of publications examining the effects of COVID-19 on UTUCC, the present study aims to assess how pandemic-related healthcare disruptions influenced wait times for UTUCC surgery and analyze the incidence of any adverse final pathology arising from pandemic-related surgical delays. This article was previously presented as a meeting abstract at the 2025 The Northeastern Section of the American Urological Association (NSAUA) meeting on October 11, 2025.

Materials And Methods

The study protocol was approved by the Newfoundland and Labrador (NL) Health Research Ethics Board (approval number: 2024.062) and the Research Proposals Approval Committee. A waiver of consent was granted due to the retrospective design. There was no direct interaction with the included participants, and data were anonymized prior to analysis.

A retrospective chart review was performed on all surgically resected cases of UTUCC from January 1, 2018, to November 30, 2024, at our tertiary care center (Health Sciences Centre, St. John's, Canada). Patients were identified via institutional operating room procedural codes. The source population consisted of adult patients who underwent surgical management for suspected UTUCC during the study period. Patients with non-UCC on final pathology were excluded from final analysis.

Inclusion criteria included age greater than or equal to 18 years at the time of surgery and patients who underwent surgical nephroureterectomy or distal ureterectomy during the study timeframe. Tumor staging was defined using the American Joint Committee on Cancer's (AJCC) tumor, node, and metastasis (TNM) staging system [19].

Exclusion criteria included any patient under the age of 18 at the time of surgery and any patient with final pathology demonstrating non-urothelial carcinoma histology.

Based upon the date of operative case completion, patients were categorized into a pre-pandemic phase, a pandemic-related healthcare disruption phase, and a post-pandemic phase following the lifting of restrictions. Timeframes were defined as a pre-pandemic phase, from January 1, 2018, to March 31, 2020 (27 months); a pandemic phase, from April 1, 2020, to February 28, 2022 (23 months); and a post-pandemic phase, from March 1, 2022, to November 30, 2024 (33 months).

Newfoundland and Labrador's (NL) provincial public health measures were used to define the timeframes. The pre-pandemic period ended on March 31, 2020, prior to the implementation of healthcare restrictions. The pandemic cohort ran from April 1, 2020, to February 28, 2022, covering the height of lockdowns and healthcare reallocation. Post-pandemic included March 2022 onward, when restrictions eased and services normalized. These cutoffs aligned with healthcare access trends experienced locally.

Through the cross-comparison of the three defined cohorts, the primary outcome was the proportion of patients with advanced pathological disease, defined as ⩾pT3 disease at the time of surgical resection. Secondary outcomes included surgical wait time from diagnosis to definitive resection, the presence of metastatic disease, and the utilization of neoadjuvant and adjuvant therapies, which were analyzed across cohorts. Epidemiological data, pathological data, and treatment pathways were examined for each patient.

Data analysis was conducted using Statistical Package for the Social Sciences (SPSS) version 27.0 (IBM Corp., Armonk, NY). All categorical variables were reported as percentages and absolute counts. Continuous variables were reported as means and standard deviations (SD). Differences in categorical and continuous demographic variables were compared across timeframes using chi-square and ANOVA tests, respectively. An exploratory multivariable logistic regression analysis was performed to assess factors associated with pT3 disease. Statistical significance was set at $p < 0.05$.

Results

The study identified 71 patients who underwent either nephroureterectomy or distal ureterectomy at our center between January 1, 2018, and November 30, 2024. Of these, 64 patients met the inclusion criteria, with pathology confirming UTUCC (Figure *1*).

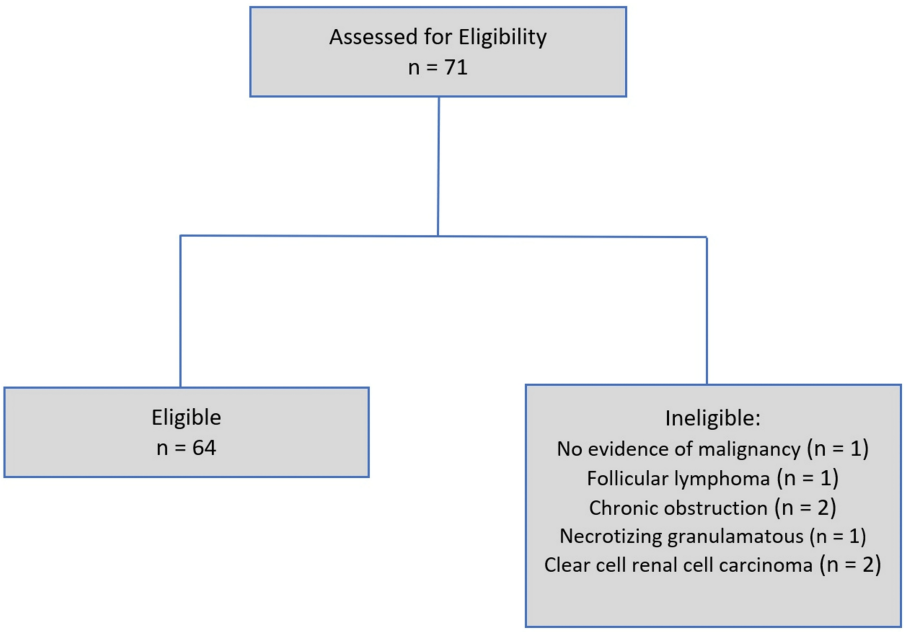


FIGURE 1: Flowchart of all surgically resected cases of upper tract urothelial cell carcinoma completed between January 1, 2018, and November 30, 2024.

Patient characteristics

The mean age of diagnosis was 70.8 ± 9.7 years. Of the 64 eligible patients, 35 (54.7%) were men. Six (9.4%) patients had confirmed Lynch syndrome, and 39 (60.9%) patients were either current or former smokers. One patient moved out of province following surgery and was lost to follow-up. Twelve patients (18.8%) had a prior history of bladder cancer. Among these, one patient had pT3 UCC, and three patients had pT1 high-grade UCC disease; all underwent radical cystectomy and later developed upper tract recurrence.

Two additional patients had a history of pTa high-grade UCC treated with transurethral resection of bladder tumor (TURBT). One patient was found to have synchronous UTUCC, while the other developed upper tract recurrence; both subsequently underwent partial cystectomy during the surgical management of their UTUCC. The remaining six patients had a history of pTa low-grade UCC treated with TURBT and subsequently developed upper tract recurrence. Patient demographics are categorized in Table *1*.

Demographic Variables	Pre-pandemic, n = 14	Pandemic, n = 23	Post-pandemic, n = 27	p	χ^2 or F	df	Cramér's V or η^2
Sex, n (%)				0.814	0.411	2.0	0.080
Male	7 (50.00%)	12 (52.17%)	16 (59.26%)				
Female	7 (50.00%)	11 (47.83%)	11 (40.74%)				
Age of diagnosis, $\bar{\chi}$ ± SD	69.53 ± 11.23	70.18 ± 7.19	72.05 ± 10.55	0.688	0.377	2.0	0.012
Smoking status, n (%)				0.622	2.627	4.0	0.143
Never	6 (42.86%)	11 (47.83%)	8 (29.63%)				
Current	3 (21.43%)	7 (30.43%)	10 (37.04%)				
Former	5 (35.71%)	5 (21.74%)	9 (33.33%)				
Lynch syndrome, n (%)				0.909	0.190	2.0	0.055
Yes	1 (7.14%)	2 (8.70%)	3 (11.11%)				
No	13 (92.86%)	21 (91.30%)	24 (88.89%)				
Previous bladder cancer stage, n (%)				0.686	2.851	6.0	0.149
pTa	3 (21.43%)	3 (13.04%)	2 (7.41%)				
pT1	0 (0.00%)	1 (4.35%)	2 (7.41%)				
pT2	0 (0.00%)	0 (0.00%)	1 (3.70%)				
No prior bladder cancer	11 (78.57%)	19 (82.61%)	22 (81.48%)				

TABLE 1: Patient demographics by cohort.

Categorical variables were compared using Pearson's χ^2 test, and age was compared using one-way ANOVA.

SD, standard deviation; χ^2, Pearson's chi-square statistic; F, ANOVA F-statistic; df, degrees of freedom; Cramér's V, effect size for categorical variables; η^2, eta-squared effect size for continuous variables

Surgical procedures completed

Surgical procedures completed for the resection of UTUCC included open nephroureterectomy, laparoscopic nephroureterectomy, and distal ureterectomy. Laparoscopic nephroureterectomy was the most common procedure, accounting for 42 (65.63%) cases (Table *2*).

Surgical Procedure	Pre-pandemic, n = 14	Pandemic, n = 23	Post-pandemic, n = 27	Totals, n = 64
Open nephroureterectomy, n (%)	4 (28.57%)	3 (13.04%)	9 (33.33%)	16 (25.00%)
Laparoscopic nephroureterectomy, n (%)	9 (64.29%)	16 (69.57%)	17 (62.96%)	42 (65.63%)
Distal ureterectomy, n (%)	1 (7.14%)	4 (17.39%)	1 (3.70%)	6 (9.38%)

TABLE 2: Surgical procedures for upper tract urothelial cell carcinoma (UTUCC), presented by cohort.

Tumor characteristics

Stage pT3 disease was found on final pathology for 71.43% of patients within the pre-pandemic cohort, 30.43% within the pandemic cohort, and 33.33% within the post-pandemic cohort. The incidence of pT3 disease decreased from the pre-pandemic to the pandemic cohort (30.43%) and then stabilized (Figure *2*).

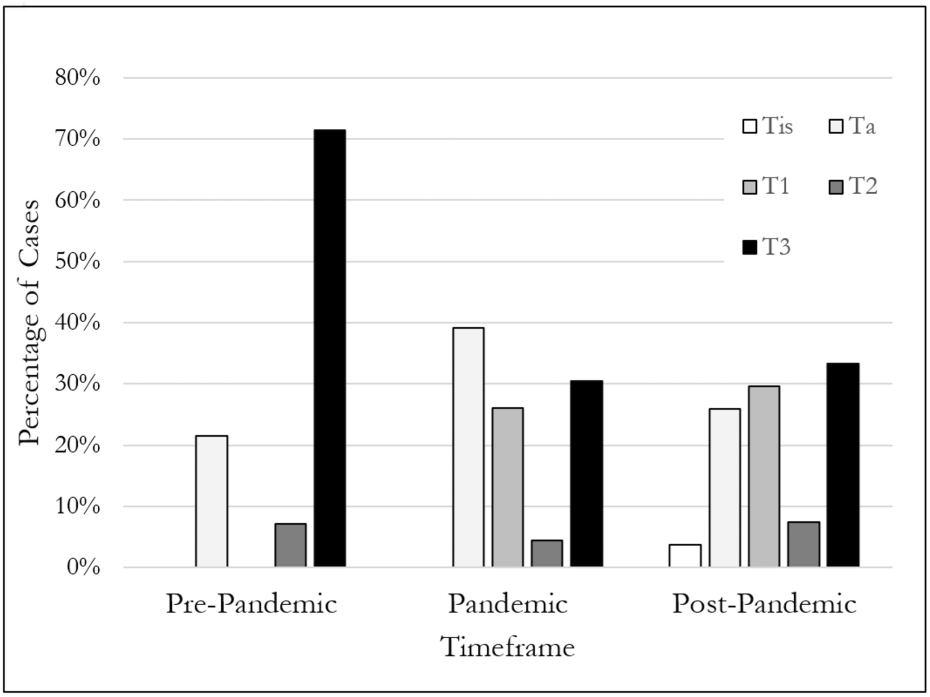


FIGURE 2: Pathological staging of upper tract urothelial cell carcinoma (UTUCC) across study timeframes.

There were 23 cases of UTUCC confined to the renal pelvis, 29 cases limited to the ureter, and 12 cases involving overlapping multifocal lesions. The use of ureteroscopy was consistent throughout the study. Only three (4.7%) patients were treated with neoadjuvant chemotherapy. Disease site and tumor characteristics are categorized within study cohorts in Table *3*.

Tumor Characteristics	Pre-pandemic, n = 14	Pandemic, n = 23	Post-pandemic, n = 27	p	χ^2	df	Cramér's V
Pathological staging, n (%)				0.206	10.923	8	0.292
pTa	3 (21.43%)	9 (39.13%)	7 (25.93%)				
pTis	0 (0.00%)	0 (0.00%)	1 (3.70%)				
pT1	0 (00.00%)	6 (26.09%)	8 (29.63%)				
pT2	1 (7.14%)	1 (4.35%)	2 (7.41%)				
pT3	10 (71.43%)	7 (30.43%)	9 (33.33%)				
Nodal assessment, n (%)				0.608	2.708	4	0.145
NX	9 (64.29%)	16 (69.57%)	14 (51.85%)				
N0	5 (35.71%)	7 (30.43%)	12 (44.44%)				
N2	0 (0.00%)	0 (0.00%)	1 (3.70%)				
Grade, n (%)				0.479	1.474	2	0.152
Low grade	1 (7.14%)	4 (17.39%)	6 (22.22%)				
High grade	13 (92.86%)	19 (82.61%)	21 (77.78%)				
Laterality, n (%)				0.103	4.540	2	0.266
Right	7 (50.00%)	5 (21.74%)	13 (48.15%)				
Left	7 (50.00%)	18 (78.26%)	14 (51.85%)				
Disease site, n (%)				0.536	3.132	4	0.156
Renal pelvis	3 (21.43%)	8 (34.78%)	12 (44.44%)				
Ureter	7 (50.00%)	10 (43.48%)	12 (44.44%)				
Overlapping lesions	4 (28.57%)	5 (21.74%)	3 (11.11%)				
Ureteroscopy diagnosis, n (%)				0.564	4.847	6	0.195
Ureteroscopy with biopsy	4 (28.57%)	9 (39.13%)	12 (44.44%)				
Ureteroscopy without biopsy	7 (50.00%)	7 (30.43%)	7 (25.93%)				
CT	2 (14.29%)	6 (26.09%)	8 (29.63%)				
MRI + retrograde pyelogram	1 (7.14%)	1 (4.35%)	0 (0.00%)				
Neoadjuvant chemo, n (%)				0.881	0.253	2	0.063
Yes	1 (7.14%)	1 (4.35%)	1 (3.70%)				
No	13 (92.86%)	22 (95.65%)	26 (96.30%)				

TABLE 3: Tumor characteristics for upper tract urothelial cell carcinoma (UTUCC) cases organized by cohort.

Pearson's χ^2 test was used to compare categorical variables between cohorts, with Cramér's V reported as the effect size.

χ^2, Pearson's chi-square statistic; df, degrees of freedom; Cramér's V, effect size; CT, computed tomography; MRI, magnetic resonance imaging; pTa, noninvasive papillary carcinoma; pTis, carcinoma in situ; pT1, tumor invades subepithelial connective tissue; pT2, tumor invades muscularis; pT3, tumor extends beyond muscle; NX, regional lymph nodes not assessed; N0, no lymph node metastasis; N2, metastasis to multiple regional lymph nodes

Surgical wait times

Wait times for UTUCC surgery were most variable during the pandemic cohort (average, 88.7 days; SD, ±116.6). Delays to surgical resection returned to historical norms in the post-pandemic cohort (average, 62.8

days; SD, ±38.6) and coincided with the lifting of pandemic-associated healthcare restrictions. No significant operative delays were identified across the three cohorts (p = 0.574) (Figure 3).

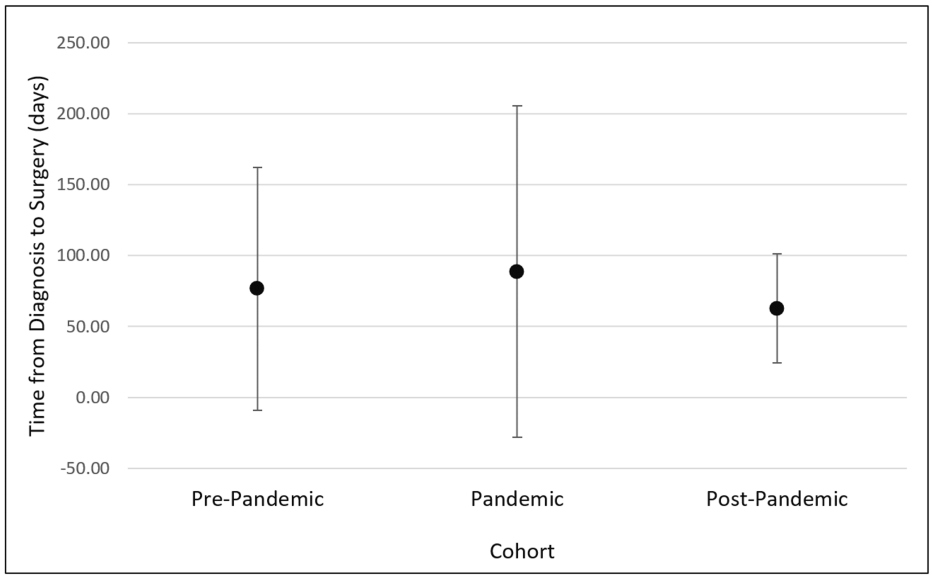


FIGURE 3: Mean time from diagnosis to surgery across the study cohorts, with error bars indicating standard deviation (SD).

Patient outcomes

Thirty cases were found to have pT2 or greater and/or node-positive (N+) disease, making such patients eligible for adjuvant treatment. Of these, eight (26.7%) received adjuvant chemotherapy, two (6.67%) received adjuvant nivolumab immunotherapy, and 18 (60.0%) were not eligible for either adjuvant treatment. The remaining two patients declined oncology consultation, with one subsequently lost to follow-up and the other managed with active surveillance for both UTUCC and bladder recurrence.

Thirteen patients were deemed ineligible for adjuvant therapy due to comorbidities and poor renal function. Five patients were found to have metastatic disease at the time of UTUCC diagnosis and were managed with palliative intent, with two receiving palliative chemotherapy, two receiving palliative radiation, and one receiving comfort care only. Overall, 93.3% of patients who met pathological criteria for adjuvant therapy (pT2 or above and/or N+) were referred to medical oncology.

Fourteen patients (21.9%) demonstrated metastatic UTUCC during the study timeframe. Sites of metastases included the pelvic region, mediastinal and retroperitoneal lymph nodes, osseous metastases, and distant visceral deposits in the liver and lungs. There was no statistically significant variability in metastasis across study cohorts (p = 0.436). Treatment for cases of metastasis included chemotherapy, radiation, immunotherapy, and hospice care.

Multivariable analysis

An exploratory multivariable logistic regression analysis was performed to assess factors associated with pT3 disease. After adjustment for age, smoking status, prior bladder cancer, and Lynch syndrome, the incidence of pT3 pathology remained significant (p = 0.034) across patient cohorts. Compared to the pre-pandemic cohort, patients treated during the pandemic and post-pandemic period had significantly lower odds of pT3 disease. No other variables were significantly associated with pT3 pathology (Table 4).

Variable	Odds Ratio (OR)	95% Confidence Interval	p	Wald χ^2	df
Age (per year)	1.02	0.96-1.08	0.544	0.369	1
Smoking (current/former versus never)	0.87	0.27-2.79	0.815	0.055	1
Prior bladder cancer (yes versus no)	0.33	0.07-1.69	0.185	1.756	1
Lynch syndrome (yes versus no)	0.30	0.02-3.76	0.350	0.872	1
Pandemic cohort versus pre-pandemic	0.15	0.03-0.68	0.014	5.988	1
Post-pandemic cohort versus pre-pandemic	0.17	0.04-0.78	0.022	5.217	1

TABLE 4: Multivariable logistic regression analysis of factors associated with pT3 UTUCC.

Multivariable binary logistic regression with Wald χ^2 tests was used to assess associations with pathological stage ≥pT3.

UTUCC, upper tract urothelial cell carcinoma; df, degrees of freedom

Discussion

The present study aimed to evaluate the effects of COVID-19 pandemic-related healthcare restrictions at a high-volume Canadian institution on operative delays and the incidence of adverse pathology for patients requiring the surgical resection of UTUCC. During the pandemic, the healthcare system in NL implemented several restrictions aimed at preserving healthcare capacity and limiting viral transmission. This included the temporary suspension of nonurgent elective surgeries, reduced outpatient clinic volumes, and delays in diagnostic testing. In addition, strict inter-provincial travel restrictions and mandatory quarantine requirements created barriers for patients travelling from rural regions to our tertiary care center where surgical management was centralized. Operating room availability was severely limited by infection-control protocols. Likewise, the conversion of our postoperative recovery room to an overflow intensive care unit (ICU) added to delays in the surgical management of disease and the ureteroscopic confirmation of suspected UTUCC cases.

National data from Canada have quantified the magnitude of surgical disruption during the pandemic [20]. An environmental scan of surgical delivery across Canadian jurisdictions reported that operative volumes fell to approximately 60%-70% of baseline levels during peak pandemic waves, and provinces widely cancelled elective procedures to preserve ICU capacity [20]. Despite these system-level disruptions and previous reports indicating a surge of advanced genitourinary pathology associated with pandemic-related restrictions, we did not find an increased incidence of adverse (≥pT3) UTUCC during a comparable timeframe of healthcare restrictions [4,17,18].

Similarly, Tsuruta et al. completed a multicenter retrospective study of 304 patients having undergone radical nephroureterectomy, comparing outcomes between pre-pandemic and pandemic cohorts [21]. They found no significant differences in pathological findings across cohorts but did note a significant decline in the use of adjuvant chemotherapy during the pandemic [21]. Another retrospective study conducted at a German referral center compared outcomes for 36 UTUCC patients who underwent radical nephroureterectomies in defined pre-, during-, and post-pandemic cohorts [22]. They identified that surgical delays of up to 12 weeks were not associated with adverse survival outcomes for patients with high-grade UTUCC [22]. Interestingly, while neither study achieved statistical significance in disease presentation, both reported similar decreases in late-stage pT3 UTUCC [21,22].

Furthermore, Grosso et al. evaluated 9196 patients treated for urological malignancies, including 355 surgically managed UTUCC cases, and found no differences in recorded pathological variables [23]. This remained true when aligning with European Association of Urology (EAU) guidelines on surgical prioritization, which recommended waiting periods of 30 days for nephroureterectomy in high-risk disease, and reflecting the need to allocate limited surgical resources toward malignancies requiring more immediate intervention such as radical cystectomy [23].

In contrast, others have reported worsened pathological findings and survival for genitourinary malignancies during the pandemic. A previous meta-analysis of six studies (n = 4629) involving surgically managed UTUCC found that delays between UTUCC diagnosis and nephroureterectomy were associated with poorer overall survival, especially when surgical delays exceeded three months [24].

Indeed, the broader oncologic literature has frequently reported stage migration toward more advanced and metastatic disease during the COVID-19 pandemic and subsequent earlier patient mortality [25]. Such

findings have correlated with concomitant delays in referral and diagnostic interruptions. In a comprehensive review, diagnostic delays and advanced-stage detection were common across multiple cancer sites, with only 6% of studies reporting an earlier-stage detection during the pandemic, none of which involved genitourinary malignancy [26]. Specifically, studies of endometrial cancer and melanoma demonstrated significant stage migration toward more aggressive pathology during times of pandemic-related healthcare restrictions [27,28].

Our findings add to the growing body of literature assessing the influence of the COVID-19 pandemic on genitourinary malignancies. Previous publications from our institution on RCC, testicular cancer, and penile carcinoma identified diagnostic or treatment delays and temporal differences in disease stage, although the magnitude and statistical significance of these findings varied by malignancy [4,17,18]. While it is well accepted that deferred treatment for UTUCC may too worsen prognosis, our study did not find an increased incidence of pT3 UTUCC disease [24]. This finding remained valid following adjustment for age, smoking status, prior bladder cancer, and Lynch syndrome.

While this observation contrasts with trends reported within the broader oncologic literature, it proposes that pandemic-related differences in disease incidence may arise not only between geographic locations but also among cancer-specific sites within an individual healthcare institution. This finding may also reflect the absence of significant surgical delays identified between cohorts within the present study despite the most drastic variance in surgical wait times coinciding with the COVID-19 pandemic cohort.

Several factors may have contributed to the preservation of UTUCC prognosis and surgical wait times despite broader healthcare disruptions. Differences in local disease presentation, rural referral patterns, diagnostic prioritization, and surgical classification could have all led to UTUCC cases being completed during a time of limited operative availability and at the expense of other urological conditions. Another hypothesis is that our institution may have triaged patients with concerning ureteroscopic or imagery findings ahead of patients with the absence of such suspicious features. Such theories could explain the relative preservation of surgical wait times for UTUCC while inadvertently delaying surgery for other cases not captured in our cohort.

Our study has several limitations. We acknowledge that our retrospective design limits statistical inference. Our overall sample size is modest (n = 64), and subgroup analyses are further constrained by smaller sample sizes and variable study durations, limiting statistical power. This increases the risk of type II error and limits the interpretation of comparisons between cohorts. The study was limited to patients who underwent surgical resection, introducing potential selection bias against patients who may have been managed nonsurgically, had surgery deferred, or died before surgery and were not captured. We also acknowledge that our multivariable analysis involved a limited sample size and wide confidence intervals, which increase the risk of model instability and overfitting.

From a broader perspective, our results highlight the importance of evaluating the effects of pandemic-related healthcare disruptions on individual disease sites rather than extrapolating findings across malignancies. Such data may better inform future planning and triage strategies during periods of institution-specific healthcare disruption.

Conclusions

Despite marked healthcare restrictions during the COVID-19 pandemic, we identified an absence of significant operative delays for UTUCC surgical resection and did not experience an increased incidence of adverse UTUCC pathology. Although the proportion of pT3 disease was lower during and after the pandemic, this finding should be interpreted cautiously given the small cohort and exploratory nature of the multivariable analysis. Continued research is needed to further refine the influence of COVID-19 restrictions on individual genitourinary malignancies.

Additional Information

Author Contributions

All authors have reviewed the final version to be published and agreed to be accountable for all aspects of the work.

Concept and design: Tyler Whitten, William C. I. Janes, Matthew Andrews

Acquisition, analysis, or interpretation of data: Tyler Whitten, Matthew Andrews, Michael Organ, Matthew Young

Drafting of the manuscript: Tyler Whitten, Matthew Andrews

Critical review of the manuscript for important intellectual content: Tyler Whitten, William C. I. Janes, Matthew Andrews, Michael Organ, Matthew Young

Disclosures

Human subjects: Informed consent for treatment and open access publication was obtained or waived by all participants in this study. The Newfoundland and Labrador Health Research Ethics Board issued approval 2024.062. **Animal subjects:** All authors have confirmed that this study did not involve animal subjects or tissue. **Conflicts of interest:** In compliance with the ICMJE uniform disclosure form, all authors declare the following: **Payment/services info:** All authors have declared that no financial support was received from any organization for the submitted work. **Financial relationships:** All authors have declared that they have no financial relationships at present or within the previous three years with any organizations that might have an interest in the submitted work. **Other relationships:** All authors have declared that there are no other relationships or activities that could appear to have influenced the submitted work.

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