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Case Report

Renal Cell Carcinoma with Tumor Thrombus Invading Through the Renal Vein (Level I) During the Covid-19 Pandemic: A Report of 2 Cases

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Abstract

Objectives: Renal Cell Carcinoma (RCC) with Tumor Thrombus (TT) poses a challenge due to the potential for massive hemorrhage and tumor thromboemboli. We report our experience with 2 patients having RCC and TT during Covid-19 pandemic.

Methods: During April 2020, 2 patients underwent resection of RCC with TT extending through the Renal Vein (RV) into the Inferior Vena Cava (IVC) (level I). Due to the Covid-19 pandemic, Jackson Memorial Hospital would only allow the performance of surgery on emergency/urgent cases. The patients desired surgery as soon as possible, despite the Covid-19 pandemic. After further consultation with hospital authorities, it was determined that these 2 cases met the criteria to receive immediate surgery. Email/cell phone/zoom video conferencing were offered to family members for support. The surgical approach used transplant-based techniques to mobilize the liver off the IVC and the pancreas-spleen en-bloc, separating the IVC from the posterior abdominal wall for safe tumor removal on the right or left side.

Results: Both patients tested negative for Covid-19 48 hours before surgery. Operative time was 105 and 85 minutes for patients #1 and #2, respectively. Estimated blood loss was 100cc and 50cc, respectively; there were no complications in the immediate postoperative period. Patient #1 was discharged on postoperative day 2, and patient #2 was discharged on postoperative day 1.

Conclusions: An aggressive surgical approach is the only hope for curing patients having RCC with TT extending into the IVC. For the patients and family it was more important to have immediate surgical removal of the cancer versus worrying about Covid-19 exposure.

Introduction

Renal Cell Carcinoma (RCC) infrequently extends into the Renal Vein (RV) and Inferior Vena Cava (IVC) [1, 2]. Surgery offers the only potential cure for these patients [3, 4]. As Jackson Memorial Hospital (JMH) started preparing for the surge of Covid-19 cases in Miami, it was decided to cancel elective surgeries in order to make available as many of the hospitals beds, intensive care units' beds, as well as nursing staff for the possibility of a dramatically increased need to treat Covid-19 patients admitted to JMH [5]. The American College of Surgeons also recommended the cancellation of elective surgeries [6]. During the end of March 2020, 2 patients presented to our institution with RCC and tumor thrombus extending through the RV into the IVC (level I tumor thrombus).

These 2 patients were initially told that they would have to wait until the immediate needs of JMH in treating Covid-19 patients began to subside, i.e., when JMH would re-authorize performance of elective surgeries. Both patients and their families became anxious at having to wait, knowing that their loved one had an advanced form of cancer with surgery as the only known

possible cure. However, recent articles in the urology literature show that more advanced RCC tumors, particularly those with tumor thrombus, may progress rapidly and therefore require immediate attention [7-9]. Thus, a decision to proceed with the surgery without waiting any longer was made in each case. Here, we describe our experience in managing these 2 patients with RCC and Level I tumor thrombus during the Covid-19 pandemic and how they were managed in the attempt to avoid their exposure to Covid-19.

Materials and Methods

At the end of March of 2020, 2 patients were referred to JMH for treatment of RCC with tumor thrombus extending through the RV into the IVC (level I thrombus). The cranial extent of the tumor was initially defined per Neves and Zincke [10]. Transesophageal Echocardiography (TEE) was used to check for any pulmonary emboli existing before starting the surgery and was also performed at the end of surgery to carefully check for any pulmonary emboli that may have developed and lodged during the procedure [11, 12]. The study was approved by the University of Miami Institutional Review Board. Patient #1 had a right renal tumor with extension into the renal vein and a mass growing under the cava. The diagnosis of the right renal mass with tumor thrombus was made during routine physical examination.

Urine analysis showed microscopic hematuria (>25 RBC per HPF) (normal < 2 per HPF), and the work-up included ultrasound, Computerized Tomography (CT) scan, and Magnetic Resonance Imaging (MRI) (Figure 1A and 1B). Patient #2 had gross hematuria with repeated urine tests but finally had an ultrasound and CT scan showing a left renal mass with level I tumor thrombus (Figure 2A and 2B). Both patients were referred to JMH for further surgical evaluation during the Covid-19 pandemic. Clinical and pathological staging were performed using the TNM classification. Tumor grade was classified according to the Furhman grading system. In the past, we developed a surgical safety checklist for the performance of radical nephrectomy with tumor thrombectomy with the goal of decreasing the significant rates of perioperative morbidity and mortality [13]. We added the following items to the checklist for these 2 patients undergoing radical nephrectomy and resection of the tumor thrombus during the Covid-19 pandemic.

Before Surgery

- Both patients were tested for Covid-19 48 hours before surgery.
- No family members were allowed to visit on the day of surgery.

During the Surgery

- The participating cardiovascular anesthesiologist had previous experience in using TEE. Of note, use of TEE is very important to perform before surgery, because some patients can initially present (before surgery) with tumor emboli invasion into the lungs [12].
- Cell saver was used during surgery to avoid blood transfusions, although so far there is no evidence of Covid-19 transmission through blood transfusions [14].

Of note, the use of transplant-based techniques helped with the rapid dissection and safe removal of both renal tumor and tumor thrombus [1-3, 15]. The abdominal closure was performed running subcuticular with monocryl 4-0 absorbable suture to avoid extra visits for staples removal.

After the Surgery

- The patients went to recovery room and after 4 hours, they went to the Transplant Unit, where strict regulations about Covid-19 were already implemented by JMH and were followed by the nursing staff [5].
- No family members were allowed to visit during the post-operative period, but a daily update was given to them via zoom video, a regular phone call, or texting.

On post-operative day 0 a liquid diet was started a few hours after surgery for both patients. On post-operative day 1, subcutaneous heparin was started (5000 IU q12 hours) for both patients. In addition, out of bed was prescribed, and the foley catheter was removed. Personal protective equipment was used for both patients, and they were treated like transplant patients.

Operative Technique

The surgical technique has already been described at length previously for both right and left RCC tumors with tumor thrombus [1, 3, 15]. Briefly, a sub-costal incision was made commencing approximately 2 fingerbreadths below the right or left (according to the tumor location) costal margin, extending out laterally to the mid axillary line. A Rochard self-retaining retractor was placed elevating the costal margins and splaying them laterally toward the axillae. We pursued early intraoperative ligation of the involved renal artery. The kidney was mobilized medially with the liver or en bloc with the spleen and pancreas until the renal artery was identified and ligated [16].

Arterial ligation resulted in decompression of collateral circulation, decreasing blood loss, which is very important in order to avoid the need for blood transfusions. The rest of the procedure

has been described at length previously [1, 3, 15]. Patient #1 had a right tumor that was growing under the cava, and the IVC needed to be mobilized extensively in order to allow for a complete resection (Figure 1A). For both patients, there was no need to open the IVC, as both tumor thrombi were milked into the Renal Vein (RV), with the RV subsequently being ligated and divided. Evicel® was used over the remnant of the renal hilum, renal fossa and along the cavotomy of the IVC.

Results

Mean operative time was 2 hours and 15 minutes and 1 hour and 25 minutes for patients #1 and #2, respectively. Pathological examination revealed RCC of the clear cell type with sarcomatoid features in patient #1 and RCC clear cell type in patient #2. Tumor size was 17 cm for patient #1 and 15 cm for patient #2; Furhman grade was IV and II, respectively (Figure 1B and 2B). Both patients were pT3aN0M0, and both patients had RCC with a tumor thrombus level I as described by the CT scan or the MRI (Figure 2B). Tumor-free margins were achieved in both patients. Estimated blood loss was 100cc for patient #1 and 50cc for patient #2, respectively. Neither patient received cell saver blood. Serum creatinines for patients #1 and #2 were 1.0 mg/dl and 1.1 mg/dl on the day of surgery, respectively (both within the normal range).

Pre-operative Hgb and Hct were 13.3 mg/dl and 40.4% for patient #1, and 14 mg/dl and 43.8% for patient #2, respectively (both patients were male). When patient #1 was discharged on POD 2, the Hgb and Hct were 10.5 mg/dl and 32.0%, respectively, with a serum creatinine of 1.7 mg/dl (slightly above the normal range). When patient #2 was discharged on POD 1, the Hgb and Hct were 11.6 mg/dl and 35.0%, respectively, with a serum creatinine of 1.28 mg/dl (also slightly elevated). For Patient #2 with left renal mass and level I tumor thrombus, laparoscopic surgery was not offered due to potential risk of dissemination of the Covid-19 virus due the laparoscopy gas (Figure 2A and 2B) [15].

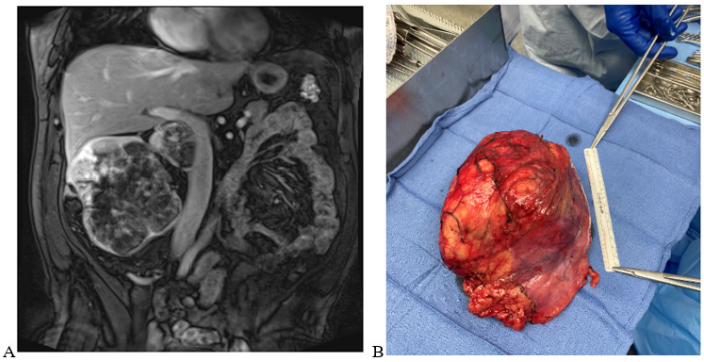

Figure 1: A) Magnetic Resonance imaging (Patient #1) showing a large right mass with a mass pushing the Inferior Vena Cava medially. **B)** Right renal mass 17 cm long (Patient #1).

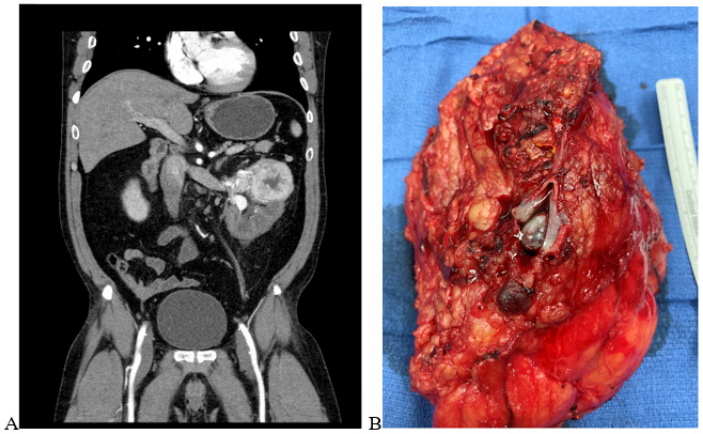

Figure 2: A) Computed Tomography scan (Patient #2) showing a renal cell carcinoma with tumor thrombus extending into the left renal vein. **B)** Large left renal mass with tumor thrombus into the left renal vein (Patient #2).

This patient had a Covid-19 test repeated on postoperative day 1, which was negative. This patient did very well and was discharged home on post-operative day 1. On post-operative day 2, Patient #1 had his diet advanced and was retested for Covid-19, which was negative (of note, aside from the Covid-19 risk, laparoscopic surgery was not considered for this patient due to the tumor's size and location). This patient was then discharged home. Both patients had a negative Covid-19 test result at the time of hospital discharge, and both patients experienced an uneventful postoperative course. After 2 weeks post-operatively, both patients were doing fine. No post-operative complications were observed in either case.

Discussion

The surgical procedure for patients with large RCC tumors with or without extension into the RV or IVC is high-risk, complex, and challenging due to the association of such tumors with difficult exposures, multiple venous collaterals, and the potential for the development of pulmonary emboli and major blood loss during surgical removal. This complex surgical situation was made even more difficult during the Covid-19 pandemic, when elective surgeries were cancelled and patients as well as surgical staff were at risk of contracting Covid-19 [6]. Unfortunately, surgery is the only reliable curative option for these patients having such complex urological tumors with tumor thrombus extending into the RV and/or IVC. Stensland et al has just published a list of urological surgeries that should be prioritized vs. delayed during the height of the COVID-19 pandemic [7].

The rationale for immediately performing radical nephrectomy for cT3+ tumors, including those with extension into

the renal vein and IVC was stated that they may progress rapidly and create more complicated surgeries, thereby also increasing post-operative morbidity and mortality risk if delayed [7, 16]. This real situation of the Covid-19 pandemic not only stresses the health system but also the patient and his/her family members. The wife of one of these two patients stated (at the time of her husband's initial presentation) that despite her understanding of the necessary restrictions being placed on the performance of any elective surgeries during the Covid-19 pandemic, her husband's current condition was one of "life or death". When dealing with RCC and tumor thrombus the critical part of the operation is the management of the IVC [1-3].

The important goals are to minimize bleeding and to prevent the development of pulmonary emboli during surgery to remove the tumor thrombus, as either event can often lead to fatal consequences. We have never preoperatively embolized any of our RCC with tumor thrombus patients, but an important principle of our surgical approach includes mobilization of the kidney with early ligation of the renal artery [1-3]. The kidney mobilization begins laterally and proceeds posteriorly paying special attention to ligate perirenal collateral circulation. With the posterior approach, fewer varices are encountered as opposed to dissection anterior to the kidney. Once the kidney is mobilized medially, the renal artery is identified, ligated and divided. The collateral circulation quickly collapses, making the rest of the dissection easier, and has the same effect as preoperative embolization but without the morbidity risks [17].

These two patients had minimal blood loss, and cell saver was not given in either case. We attribute this minimal loss of blood along with the avoidance of post-operative complications in these 2 patients to surgical experience and the use of transplant-based operative techniques as were described above and in previously published articles [1-4]. While these 2 patients did not contract Covid-19 during their hospital stay, we nonetheless cannot conclude that it will always be safe to perform complicated surgeries during the Covid-19 pandemic. Clearly, a prolonged hospitalization due to the development of one or more post-operative complications may increase the patient's risk of exposure to Covid-19. Also of note was the fact that the LOS for patients #1 and #2 was 1-2 days, below the standard LOS for open radical nephrectomy.

Berger et al recently reported, using the large American College of Surgeons National Surgical Quality Improvement Program database, that the median LOS for open nephrectomy was 4 (interquartile range: 3-6) days [18]. Ellis et al recommended that to reduce medical errors during such challenging circumstances, it is important to understand and appreciate the human factor in reducing surgical error [19]. These two patients had a complex surgical problem, and to decrease the risk of surgical errors, the surgery was described to the anesthesiology team and to the nurses in detail; the medical staff were also immediately made aware of the negative Covid-19 test results in these 2 patients. It is important for these complex urological tumor cases to have a checklist to facilitate the surgery and to decrease the risk of making surgical errors [13].

Conclusions

We described two patients with RCC and tumor thrombus that underwent radical nephrectomy and mobilization of the IVC to remove the tumor thrombus during the Covid-19 pandemic. We used our checklist for these complex urological cases and the recommendations given by the hospital during the Covid-19 crisis.

References

1. Ciancio G, Livingstone AS, Soloway M (2007) Surgical management of renal cell carcinoma with tumor thrombus in the renal and inferior vena cava: the University of Miami experience in using liver transplantation techniques. Eur Urol 51: 988-994.

2. González J, Gaynor JJ, Martínez-Salamanca JI, Capitanio U, Tilki D, et al. (2019) Association of an organ transplant-based approach with a dramatic reduction in postoperative complications following radical nephrectomy and tumor thrombectomy in renal cell carcinoma. Eur J Surg Oncol 45: 1983-1992.

3. Ciancio G, Gonzalez J, Shirodkar SP, Angulo JC, Soloway MS (2011) Liver transplantation techniques for the surgical management of renal cell carcinoma with tumor thrombus in the inferior vena cava: step-by-step description. Eur Urol 59: 401-406.

4. Ciancio G, Manoharan M, Katkoori D, De Los Santos R, Soloway MS (2010) Long-term survival in patients undergoing radical nephrectomy and inferior vena cava thrombectomy: single-center experience. Eur Urol 57: 667-672.

5. Jackson Health System (2020) COVID-19 (Novel Coronavirus 2019) Protocol.

6. American College of Surgeons (2020) Covid-19: recommendations for management of elective surgical procedures.

7. Stensland KD, Morgan TM, Moinzadeh A, Lee CT, Briganti A, et al. (2020) Considerations in the Triage of Urologic Surgeries During the COVID-19 Pandemic. Eur Urol.

8. Froehner M, Heberling U, Zastrow S, Toma M, Wirth MP (2016) Growth of a Level III Vena Cava Tumor Thrombus within 1 Month. Urology 90: e1-e2.

9. Campi R, Amparore D, Capitanio U, Checcucci E, Salonia A, et al. (2020) Assessing the Burden of Nondeferrable Major Uro-oncologic Surgery to Guide Prioritisation Strategies During the COVID-19 Pandemic: Insights from Three Italian High-volume Referral Centres. Eur Urol S0302-S2838: 30229-30303.

10. Neves RJ and Zincke H (1987) Surgical Treatment of Renal Cancer with Vena Cava Extension. Br J Urol 59: 390-395.

11. Fukazawa K, Gologorsky E, Naguit K, Pretto EA Jr, Salerno TA, et al. (2014) Invasive renal cell carcinoma with inferior vena cava tumor thrombus: cardiac anesthesia in liver transplant settings. Cardiothorac Vasc Anesth 28: 640-646.

12. Serena G, Gonzalez J, Gaynor JJ, Salerno T, Verzaro R, et al. (2019) Pulmonary tumor embolization as early manifestation in patients with renal cell carcinoma and tumor thrombus: Perioperative management and outcomes. J Card Surg 34: 1018-1023.

13. Joshi S, Gorin MA, Ayyathurai R, Ciancio G (2012) Development of a surgical safety checklist for the performance of radical nephrectomy and tumor thrombectomy. Patient Saf Surg 6: 27.

14. Cai X, Ren M, Chen F, Li L, Lei H, et al. (2020) Blood transfusion during the COVID-19 outbreak. Blood Transfus 18: 79-82.

15. Ciancio G, Vaidya A, Shirodkar S, Manoharan M, Hakky T, et al. (2009) En bloc mobilization of the pancreas and spleen to facilitate resection of large tumors, primarily renal and adrenal, in the left upper quadrant of the abdomen: techniques derived from multivisceral transplantation. Eur Urol 55: 1106-1111.

16. SAGES (2020) Society of American Gastrointestinal and Endoscopic Surgeons recommendations regarding surgical response to Covid-19 crisis.

17. Ciancio G, Vaidya A, Soloway M (2003) Early ligation of the renal artery using the posterior approach: a basic surgical concept reinforced during resection of large hypervascular renal cell carcinoma with or without inferior vena cava thrombus. BJU Int 92: 488-489.

18. Berger I, Xia L, Wirtalla C, Guzzo TJ, Kelz RR (2019) Early discharge after radical nephrectomy: An analysis of complications and readmissions. Clin Genitourin Cancer 17: e293-e305.

19. Ellis R, Hay-David AGC, Brennan PA (2020) Operating during the COVID-19 pandemic: How to reduce medical error. Br J Oral Maxillofac Surg.