

SIMULTANEOUS SURGICAL MANAGEMENT OF HEART DISEASES AND KIDNEY CANCER: A CASE SERIES

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ABSTRACT

Relevance: Renal cell carcinoma (RCC), the most common type of kidney cancer, poses a significant health burden worldwide. Despite advancements in diagnostic techniques and treatment modalities, RCC remains a formidable challenge due to its heterogeneous nature, varied clinical presentations, and complex molecular landscape. Understanding the intricacies of RCC is crucial for improving patient outcomes, optimizing therapeutic strategies, and advancing personalized medicine approaches.

The study aimed to investigate the feasibility and outcomes of simultaneous surgeries in patients with kidney cancers and heart diseases, aiming to address the current centralization of specialized care.

Methods: The authors evaluated and analyzed five cases of simultaneous surgeries performed at the National Scientific Medical Center (Astana, Kazakhstan) from January 2012 to December 2023. Each case provides unique insights into the diagnostic challenges, treatment dilemmas, and long-term outcomes associated with RCC.

Results: From January 2012 to December 2023, we evaluated and analyzed 5 cases of simultaneous surgeries at the National Scientific Medical Center, Astana. Each case offers unique insights into the diagnostic challenges, treatment dilemmas, and long-term outcomes associated with RCC.

Conclusion: Simultaneous surgeries for RCC and concomitant diseases represent a viable approach to optimize patient care and streamline treatment. These cases demonstrate the successful management of RCC alongside various comorbidities, highlighting the importance of multidisciplinary collaboration and careful surgical planning. By addressing multiple conditions in a single procedure, simultaneous surgeries offer a promising strategy to improve outcomes and enhance patient satisfaction in managing RCC.

Keywords: kidney, cancer, heart, ischemic, aortic valve, simultaneous surgery.

Introduction: Kidney cancer ranks sixth among male cancers and accounts for 5% of all cancer cases. It is also the tenth most prevalent malignancy in women and the source of 3% of malignancies [1]. The lungs, liver, brain, bone, and adrenal glands are the organs most commonly afflicted, and it has a significant propensity to spread. Early detection of RCC is essential for patient treatment and decreasing death rates. Nevertheless, the best methods and techniques for screening have not yet been determined.

Selecting the most effective therapy strategy is essential to enhancing the prognosis of RCC patients [1]. There have been documented cases of late metastases from RCC in the literature, occurring even decades following the initial tumor's potentially curative surgical resection; around one in three RCC patients eventually develop distant metastases [2].

Localized Kidney cancer is potentially curable by surgery alone (i.e., stage I–III), though recurrence is seen in 3%–30% depending on the stage. It has been estimated that 4–10% of individuals undergoing nephrectomy to treat cancer have a direct extension of RCC into the inferior vena cava (IVC). Kidney cancer often coexists with other medical conditions, presenting challenges in treatment planning. Tumor thrombi can extend into the right atrium in 0.3–1% of patients with RCC [3].

The study aimed to investigate the feasibility and outcomes of simultaneous surgeries in patients with kidney

cancers and heart diseases, aiming to address the current centralization of specialized care.

Moreover, by publishing this article, we want to emphasize the possibility of performing simultaneous surgery, which should be a part of the daily surgical plan in hospitals to benefit our patients.

Materials and Methods: The study was conducted at the National Scientific Medical Center in Astana, Kazakhstan, from January 2012 to July 2023. A total of 5 simultaneous surgeries were performed during this timeframe. The retrospective analysis involved thoroughly examining the patient's medical records to ascertain crucial data points, including the type of surgical procedure, operation duration, intraoperative complications, intensive care unit (ICU) stay, and postoperative recovery period. Survival analysis was conducted using the Kaplan-Meier method, with the date of surgical intervention as the starting point and the date of death or the last observation as the endpoint. This statistical approach facilitated the estimation of cumulative survival probabilities over the designated follow-up period.

Ethical approval for this retrospective study was obtained from the institutional review board of the National Scientific Medical Center, Astana, ensuring adherence to ethical standards and patient confidentiality protocols. Data analysis was conducted using appropriate statistical software, and descriptive statistics were employed to

summarize patient characteristics, surgical outcomes, and long-term survival probabilities.

Results: Simultaneous surgeries for kidney conditions and heart diseases resulted in successful outcomes across all five cases. Before the surgery, the radiologic diagnosis of kidney cancer was based on computed tomography of the abdominal segment with intravenous contrast. The date of hospitalization, date of surgery, type of simul-

taneous surgeries performed, duration of the operation, intraoperative complications, transfusions, and amount of bleeding are shown below in Table 1. Table 2 contains post-op data about ICU length of stay, any complications, histology results, and date of discharge. Each patient underwent complex procedures addressing RCC and accompanying medical conditions, with satisfactory postoperative courses and no significant complications.

Table 1 – Major case findings

| Case no. | Date of hospitalization (1) and date of surgery (2) | Type of surgery | CPB or Off-pump | Duration of surgery (minutes) | Intraoperative complications | Blood transfusions | Intraoperative bleeding (mL) |
|----------|---|---|-----------------|-------------------------------|------------------------------|---|------------------------------|
| 1 | 1. 22.01.2012 2. 25.01.2012 | 1. CABG – 4 vessels, AVP with biological prosthesis 2. Laparoscopic radical right nephroureterectomy | CPB | 470 | Bleeding | During surgery: FFP – 1800 mL; RBC – 750 mL Day 1 post-op: eH67FFP – 1200 mL; RBC – 670 mL; Platelet – 250 mL; Cryoprecipitate – 40 mL. | 1000 |
| 2 | 1. 15.01.2020 2. 21.01.2020 | 1. CABG – 3 vessels, 2. Laparoscopic radical left nephroureterectomy | CPB | 330 | No | FFP – 4 doses | 250 |
| 3 | 1. 09.09.2020 2. 14.09.2020 | 1. CABG – 1 vessel 2. Open radical right nephroureterectomy | Off-pump | 220 | No | RBC – 2 doses | 100 |
| 4 | 1. 08.02.2023 2. 20.02.2023 | 1. Suture annuloplasty of the tricuspid valve Right atrial myxomectomy 2. Laparoscopic radical right nephroureterectomy | CPB | 310 | No | Before surgery – 2 doses of RBC After surgery – 3 doses of RBC | 30 |
| 5 | 1. 26.06.2023 2. 29.06.2023 | 1. CABG – 3 vessels 2. Laparoscopic left radical nephroureterectomy with resection of the left ureter orifice. | CPB | 390 | No | RBC – 1 dose | 250 |

Notes: CBP – cardiopulmonary bypass; CABG – coronary artery bypass grafting; AVP – aortic valve prosthesis; FFP – fresh frozen plasma; RBC – red blood cells

Table 2 – Major post-op findings

| Case no. | ICU stay (days) | Postoperative complications | Histology results | Date of discharge |
|----------|-----------------|---|--|-------------------|
| 1 | 3 | No | Renal cell carcinoma | 01.02.2012 |
| 2 | 4 | No | Renal cell carcinoma | 29.01.2020 |
| 3 | 4 | No | Renal cell carcinoma | 25.09.2020 |
| 4 | 3 | No | Renal cell carcinoma | 01.03.2023 |
| 5 | 5 | Acute renal failure of mixed origin (prerenal, renal tubulointerstitial nephritis) stage 2 according to KDIGO (2012) Oliguria. Chronic pyelonephritis, latent course. | Carbuncle of the kidney. Purulent ureteritis, paranephritis. | 10.07.2023 |

Case 1

A 61-year-old male with clinical stage I right kidney cancer and ischemic heart disease (IHD) undergoes coronary artery bypass grafting (CABG) and aortic valve replacement alongside laparoscopic right-sided radical nephrectomy. Despite the complexity of the procedure and aortic valve stenosis, the operation was completed successfully in 470 minutes. The intraoperative bleeding was successfully managed by transfusion of plasma and red blood cell components. The patient spent 3 days in the ICU and then discharged 7 days post-op, without any postoperative complications, highlighting the feasibility of addressing multiple conditions in a single surgery.

Case 2

A 70-year-old man with stage 1 left kidney cancer and severe coronary artery disease underwent simultaneous CABG and left-sided laparoscopic nephroureterectomy. The duration of the operation was 330 minutes, and de-

spite the patient's elderly age, the postoperative course was uneventful, and the patient was discharged without issues, emphasizing the safety of concurrent interventions in elderly patients with comorbidities. Following histological examination, the patient was diagnosed with cancer of the left kidney pT1M0N0, StI, R0.

Case 3

A 68-year-old woman diagnosed with stage I right kidney cancer and coronary artery disease undergoes internal mammary artery bypass surgery and right-sided radical nephroureterectomy simultaneously. Due to utilizing the off-pump technique, the operation time was shortened to 220 minutes. However, due to a tumor >10 cm, the patient has proposed a laparotomy. The patient was discharged without any postoperative complications, underscoring the feasibility of simultaneous surgeries even in elderly female patients. The postoperative diagnosis was cancer of the right kidney pT2N0M0, St II.

Case 4

A 60-year-old man diagnosed with stage 3 right kidney carcinoma presents with a concomitant myxoma in the right atrium and tricuspid insufficiency grade 2. Simultaneous procedures include tricuspid valve annuloplasty, myomectomy, and laparoscopic radical nephroureterectomy. Due to preoperative anemia, the patient received 2 doses of RBC pre-op and 3 doses during the operation. The operation lasted 310 minutes, and he was discharged without postoperative complications, showcasing the safety and efficacy of combined surgeries. The postoperative diagnosis was cancer of the left kidney pT3aN0M0 StIII.

Case 5

A 67-year-old man was admitted to the hospital with suspected cancer of the left kidney and IHD. Simultaneous surgery was performed without complications. However, in the postoperative period, the patient developed acute renal failure of mixed origin (prerenal, tubulointerstitial renal nephritis) stage 2, according to KDIGO (2012). Oliguria. The patient had 4 hemodialysis sessions, and despite this, the patient was discharged in satisfactory condition. Histologic examination revealed a carbuncle of the left kidney. This case was included in the analysis since the patient was initially suspected of kidney cancer and managed for cancer.

Discussion: The simultaneous surgeries in this case series highlight the complexity of managing renal cell carcinoma (RCC) alongside concomitant diseases. These cases underscore the importance of a multidisciplinary approach to treatment and the need for careful preoperative evaluation and planning to ensure optimal outcomes for patients with RCC and comorbid conditions.

In one case series, the authors discuss the role of cytoreductive nephrectomy following immunotherapy-based treatment in metastatic RCC. While the focus of their study differs from ours, it emphasizes the evolving landscape of RCC management and the importance of considering various treatment modalities in different clinical scenarios [4]. Another study explores rare metastatic sites of RCC, further highlighting the diverse presentations and challenges encountered in managing advanced disease [5].

Furthermore, the cases presented in our series align with findings from previous literature regarding the epidemiology and risk factors associated with RCC. Paglino et al. [1] provide insights into RCC's epidemiology and molecular epidemiology, emphasizing the importance of understanding the underlying mechanisms driving tumor development and progression.

The management of patients with heart disease and renal cancer presents a dilemma for physicians. Namely, which one to treat first. Both conditions carry high risks for patients. Given the elderly age of the patients and many comorbidities, performing surgery in 2 stages may entail a high risk of complications and mortality. A simultaneous surgery can reduce risks since a patient can decide long for the next surgery, resulting in a worsening condition and disease progression. A simultaneous surgery allows for avoiding tumor progression in the interstage period by performing early radical intervention on neoplasms and reducing the hospital stay.

Simultaneous operations have several benefits: shorter hospital stay, a single postoperative recovery period, lower stress level, and time-saving for the patient because preoperative preparation will be required only once. However, simultaneous operations also carry risks and disadvantages that should be discussed with the patient: increased surgery duration, prolonged anesthesia time, higher risk of bleeding, and wound infection.

Consequently, there may be additional requirements for the patient's health. Another disadvantage includes the fact that the area of surgical intervention becomes bigger, which may lead to increased pain after surgery and subsequently require more analgesics. We will have to consider all these criteria while preparing for the operation.

Kazakhstan is a developing country with a large rural population. Early detection of both diseases is currently problematic. The case series by Setia and Kedan [6] showcases the utility of point-of-care ultrasound in detecting RCC in the ambulatory setting, highlighting the importance of early diagnosis and intervention. This aligns with the principle of early detection and timely treatment emphasized in our cases, as prompt recognition of RCC allows for timely surgical intervention and improved outcomes.

The case report by Filomena et al. [3] parallels one of the presented cases of simultaneous surgical management of RCC and severe coronary artery disease with atrial thrombotic extension. Their experience underscores the feasibility and safety of concurrently addressing multiple conditions, further supporting our case series findings.

This year, in another case series [7], simultaneous surgeries for coexisting cardiac and non-cardiac pathologies were evaluated in terms of the feasibility of treatment. The paper above included a wide variety of diseases, such as benign and malignant tumors of the abdomen and thorax with concomitant heart pathologies. Compared to the other paper, this article focuses on the safety of simultaneous surgery on the heart and kidney without any major complications.

Since cardiopulmonary bypass (CPB), used in heart operations, can cause acute kidney injury (AKI) in 18.2 to 30% of patients [8], one of the major challenges for surgeons and anesthesiologists is preventing and managing AKI as a possible complication. In this paper, one out of five reviewed patients developed postoperative AKI, which eventually required hemodialysis. Fortunately, the patient's kidney function recovered. A cardiac surgeon should always be aware of AKI when using CPB in surgery. In simultaneous surgery for the heart and kidney, the possibility of AKI should always be considered in preoperative assessment and preparation. Simultaneous surgeries require great preparation and a multimodal approach to ensure it is safe and beneficial for the patient.

The presented case series contributes to the growing literature on managing RCC with concomitant heart diseases. By highlighting the feasibility and outcomes of simultaneous surgeries in complex clinical scenarios, this study emphasizes the importance of tailored treatment approaches and collaborative care in optimizing outcomes

for patients with RCC and heart diseases. Further research and collaboration are warranted to refine treatment strategies and improve patient outcomes in this challenging patient population.

Conclusion: The presented cases demonstrate successful simultaneous interventions and favorable postoperative courses, proving the feasibility and safety of simultaneous surgeries for RCC and concomitant diseases. Despite complex procedures and multiple comorbidities, all patients had favorable postoperative outcomes, underscoring the importance of multidisciplinary collaboration and meticulous surgical planning in optimizing patient care for RCC and accompanying medical conditions.

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АНДАТПА

ЖҮРЕК АУРУЛАРЫ МЕН БҮЙРЕК ҚАТЕРЛІ ІСІГІН БІР МЕЗГІЛДЕ ХИРУРГИЯЛЫҚ ЕМДЕУ: КЛИНИКАЛЫҚ ЖАҒДАЙЛАР СЕРИЯСЫ

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Өзектілігі: Бүйрек қатерлі ісігінің ең көп таралған түрі болып табылатын бүйрек жасушалық карциномасы (БЖК) бүкіл әлемде денсаулыққа айтарлықтай ауыртпалық түсіреді. Диагностикалық әдістер мен емдеу әдістеріндегі жетістіктерге қарамастан, БЖК гетерогенді табиғатына, әртүрлі клиникалық көріністеріне және күрделі молекулалық ландшафтына байланысты күрделі мәселе болып қала береді. БЖК күрделілігін түсіну пациенттердің нәтижелерін жақсарту, терапевтік стратегияларды оңтайландыру және жекелендірілген медицина тәсілдерін ілгерілету үшін өте маңызды.

Зерттеудің мақсаты – бұл жағдайлық зерттеу мамандандырылған көмектің қазіргі орталықтандырылуын шешуге бағытталған бүйрек ісігі және жүрек аурулары бар науқастарға бір мезгілде хирургиялық араласудың мүмкіндігі мен нәтижелерін зерттейді.

Әдістері: 2012 жылдың қаңтарынан 2023 жылдың желтоқсанына дейін біз Астана қаласында Ұлттық Ғылыми Медициналық Орталықта бір мезгілде жасалған оталардың 5 жағдайын бағалап, талдадық. Әрбір жағдай диагностикалық қиындықтарға, емдеу дилеммаларына және БЖК-мен байланысты ұзақ мерзімді нәтижелерге бірегей түсінік береді.

Нәтижелері: 5 науқастың 1-інде операция кезінде, 1-інде операциядан кейінгі кезеңде асқынулар болған. Барлық науқастар қанағаттанарлық жағдайда шығарылды.

Қорытынды: БЖК және жүрек ауруларына бір мезгілде жасалатын операциялар пациенттерге күтім көрсетуді оңтайландыру және емдеуді жеңілдетудің тиімді әдісі болып табылады. Бұл жағдайлар понаралық ынтымақтастық пен мұқият хирургиялық жоспарлаудың маңыздылығымен қатар, әртүрлі ілеспелі аурулармен бірге БЖК-ның сәтті басқарылуын көрсетеді. Бір процедурада бірнеше жағдайды қарастыратын бір мезгілде жасалатын операциялар нәтижелерді жақсартудың және пациенттердің БЖК-ның еміне қанағаттануының перспективасы стратегиясы болып табылады.

Түйінді сөздер: бүйрек, қатерлі ісік, жүрек, жүрек ишемиясы, қолқа қақпақшасы, симульанды ота.

АННОТАЦИЯ

ОДНОВРЕМЕННОЕ ХИРУРГИЧЕСКОЕ ЛЕЧЕНИЕ ЗАБОЛЕВАНИЙ СЕРДЦА И РАКА ПОЧКИ: СЕРИЯ СЛУЧАЕВ

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Актуальность: Почечно-клеточный рак (ПКР), наиболее распространенный тип рака почки, представляет серьезную угрозу для здоровья во всем мире. Несмотря на достижения в диагностических методах и методах лечения, ПКР остается серьезной проблемой из-за его гетерогенной природы, разнообразных клинических проявлений и сложного молекулярного ландшафта. Понимание тонкостей ПКР имеет решающее значение для улучшения результатов лечения пациентов, оптимизации терапевтических стратегий и продвижения подходов персонализированной медицины.

Цель исследования: в этом тематическом исследовании рассматриваются возможности и результаты одновременных операций у пациентов с раком почки и заболеваниями сердца, направленные на решение проблемы нынешней централизации специализированной помощи.

Методы: В период с января 2012 по декабрь 2023 года мы оценили и проанализировали 5 случаев одновременных операций в Национальном научном медицинском центре в Астане. Каждый случай дает уникальную информацию о диагностических трудностях, дилеммах лечения и отдаленных результатах, связанных с ПКР.

Результаты: Из 5 пациентов у 1 возникло интраоперационное осложнение и у 1 возникло осложнение в послеоперационном периоде. Все пациенты выписаны в удовлетворительном состоянии.

Заключение: Симультанные операции по поводу ПКР и заболеваний сердца представляют собой эффективный подход к оптимизации ухода за пациентами и рационализации лечения. Эти случаи демонстрируют успешное ведение ПКР наряду с различными сопутствующими заболеваниями, подчеркивая важность междисциплинарного сотрудничества и тщательного планирования операции. Одновременные операции, направленные на устранение нескольких состояний в рамках одной процедуры, являются многообещающей стратегией улучшения результатов и повышения удовлетворенности пациентов с ПКР.

Ключевые слова: рак, почки, сердце, ишемическая болезнь сердца, аортальный клапан, одномоментные операции.

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