

Interesting Cases - A Case Report: Renal Cell Carcinoma With Tumor Mass In IVC And Heart

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Citation

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Abstract

We describe a case that involved surgery and anesthesia for removal of a renal cell carcinoma invading right kidney, inferior vena cava (IVC) and right atrium. Since such cases are usually performed only in major hospitals we think it is worth while to report this procedure and to include a variety of images. The perioperative use of transesophageal echocardiography (TEE) in these cases is highly encouraged.

INTRODUCTION

A 70 year-old man presents with a history of gross hematuria, gross passage of clots, abdominal distention and right flank pain. He has a history of coronary artery disease with a myocardial infarction about 20 years ago. He does not currently suffer from any chest pain during physical activity. He has a history of hypertension for 20 years and is treated with calcium channel blockers. All other systems are without problems.

WORKUP

Urology workup reveals a right renal mass extending into the right renal vein, inferior vena cava and right atrium.

Figure 1

Image 1: MRI demonstrating the right renal mass extending into right renal vein and IVC

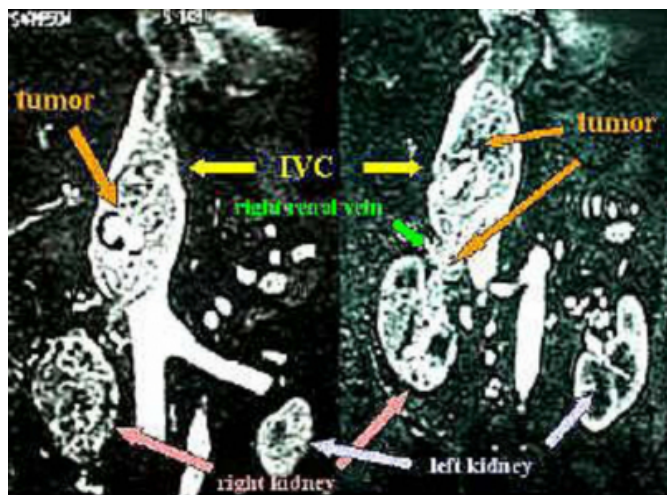


Figure 2

Image 2: CT Scan with tumor in IVC

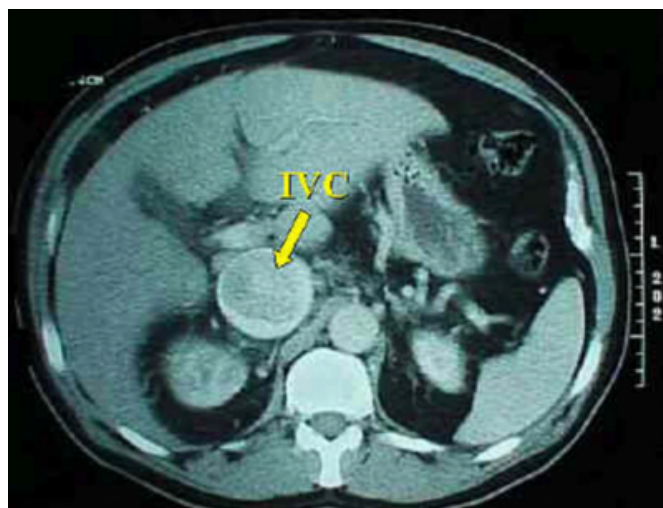


Figure 3

Image 3: Angiogram showing the vascularization of the renal mass

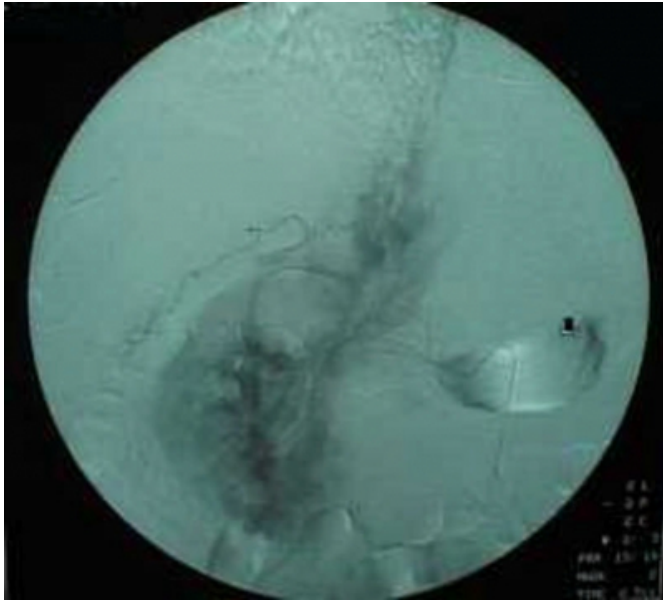
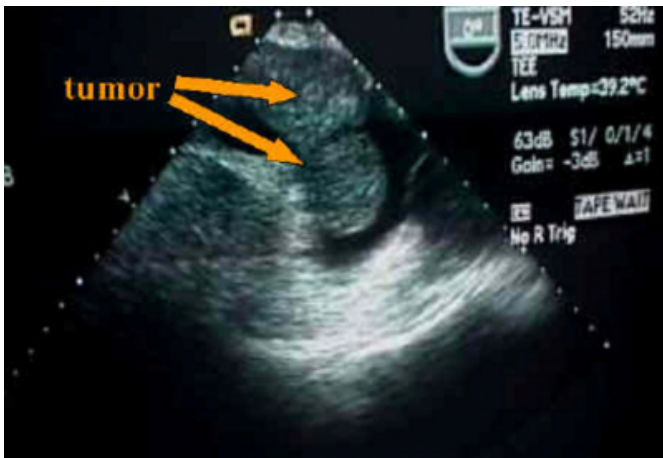


Figure 4

Image 4: Intraoperative transesophageal echocardiography showing a mass in the right atrium



Bone scan, CT scan of the brain, CT scan of the chest, and chest X-ray demonstrated no evidence of metastasis. Preoperative transthoracic echocardiography showed an ejection fraction (EF) of 60% with normal systolic and diastolic function. The intra-atrial mass was noted. No valvular problems could be diagnosed. All laboratory values were within normal limits. The electrocardiogram (EKG) showed normal sinus rhythm with an old inferior myocardial infarction. The past surgical history was insignificant.

DIAGNOSIS

Right renal mass (most likely a renal cell carcinoma)

extending into the right renal vein, inferior vena cava and right atrium. Clinical stage T3, NX, M0.

PLAN AND OPERATIVE PROCEDURE

The patient was scheduled for a right radical nephrectomy with removal of the tumor mass from the IVC and heart. In addition, he was scheduled to undergo embolization of his right kidney by vascular radiology 2 days prior to his nephrectomy.

Anesthesia was induced with midazolam 2 mg, sufentanyl 20 mcg, oxygen, etomidate 20 mg, and 60 mg rocuronium bromide. The patient was intubated with a regular # 8 endotracheal tube. Anesthesia was maintained with oxygen/air 2/2 liters/min, isoflurane, sufentanyl drip at 0.2 mcg/kg/hr, and rocuronium bromide at 4 mcg/kg/min. Both, an 8.5 french introducer and a 12 french 3-lumen central venous catheter (CVC) were inserted via the right jugular vein. The CVC's were not inserted too far in order to avoid rupture and displacement of the right atrial tumor mass. Such displacement could easily result in a massive pulmonary embolism. Blood pressure was recorded via an radial arterial catheter. Transesophageal echocardiography confirmed the right atrial mass. One of the CVC tips could be seen well above the superior vena cava (SVC) - atrial junction.

Surgery was simultaneously performed on chest and abdomen. The large vessels (aorta, superior vena cava, and femoral vein) were cannulated prior to the nephrectomy. The right kidney was removed. The patient was then put on cardiopulmonary bypass and the right atrium opened. The right atrial mass was removed in one piece. The IVC was then clamped at the tumor free distal segment and the heart was closed again. The remaining tumor mass was then removed from the IVC while the patient was rewarmed. The patient was separated from cardiopulmonary bypass without problems and the incisions were closed. After surgery, the patient was transferred to the ICU in stable condition. He was extubated the following day and transferred to the regular floor after 5 days. Total cardiopulmonary bypass time was 51 minutes with an aortic clamp time of 21 minutes. Pringle time (ischemic time to the intraabdominal organs) was 25 minutes. Estimated blood loss was 3 liters. The patient received 5 units of red blood cells, 2 units of fresh frozen plasma, and 10,4 liters of cristalloids. Total anesthesia time was 8 hours and 25 minutes.

Figure 5

Image 5: Surgical teams at work



Figure 6

Image 6: Cannulation of the large vessels



Figure 7

Image 7: All cannulas for cardiopulmonary bypass in place

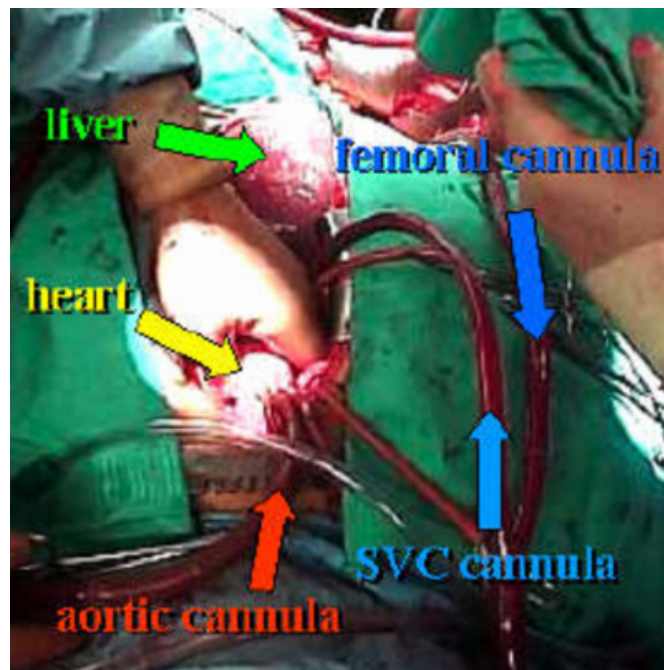


Figure 8

Image 8: Intraoperative TEE image of the right atrium after cannulation (cannulation was guided by TEE)

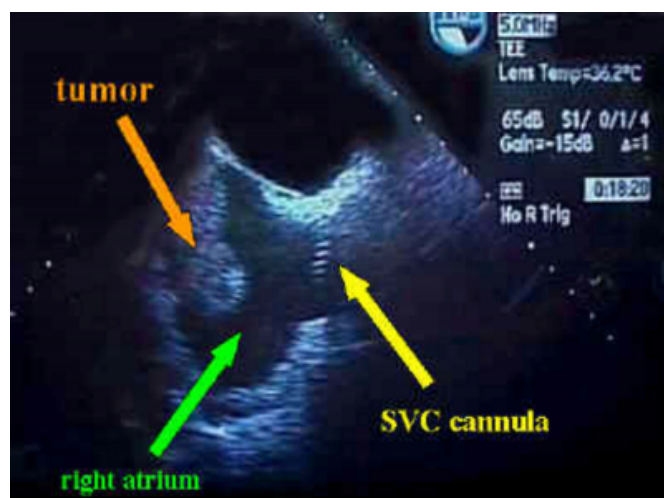


Figure 9

Image 9: Right kidney with renal cell carcinoma



Figure 11

Image 11: Intracardiac mass removed from the right atrium

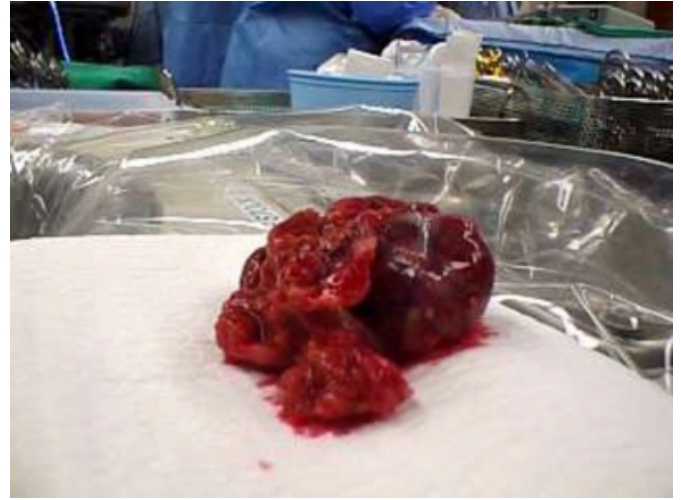


Figure 10

Image 10: Removal of the intracardiac tumor mass

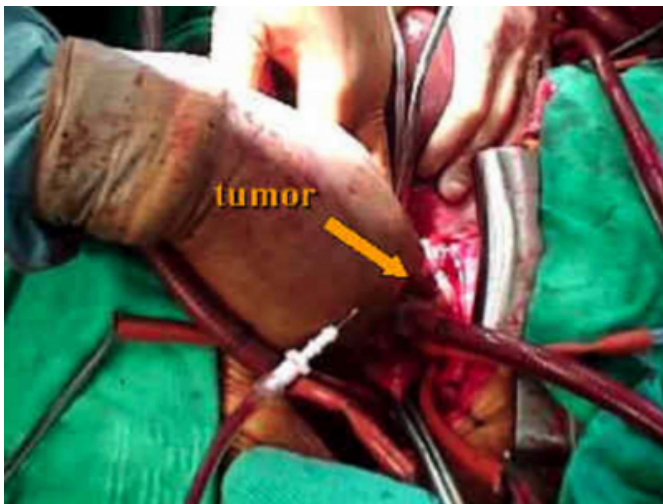


Figure 12

Image 12: Removal of remaining tumor mass from IVC



Figure 13

Image 13: Tumor mass removed from IVC



Figure 14

Image 14: Tumor mass removed from IVC

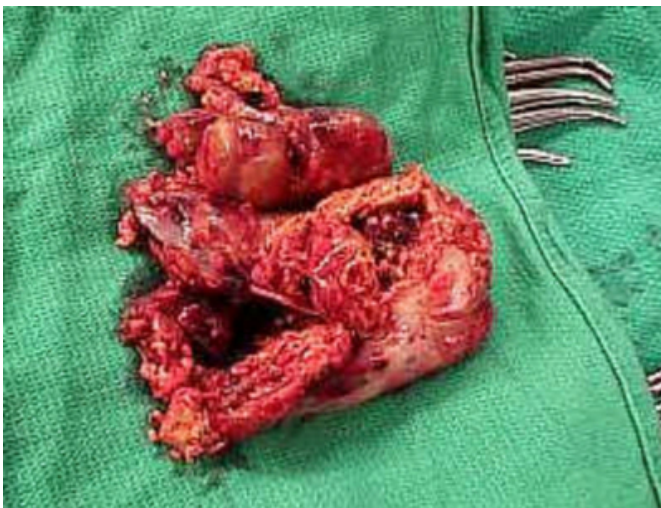
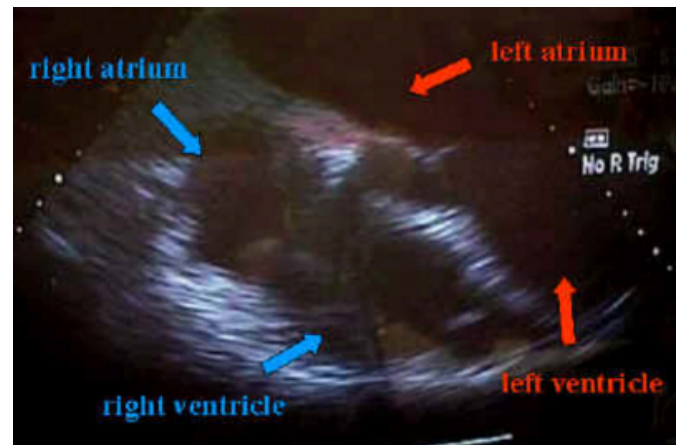


Figure 15

Image 15: Transesophageal echocardiography with no tumor mass left in right atrium



SUMMARY AND CONCLUSION

We report a case of a renal cell carcinoma extending from the right kidney into the inferior vena cava and the right atrium. Surgery, anesthesia, intensive care and nursing went uneventful. The surgical procedure for such cases requires cardiopulmonary bypass. The general surgical and anesthesiologic community does not see this kind of surgery very often. This is the reason for adding such a case to our series describing unusual, rare, or interesting procedures.

We would like to point out certain details:

1. Good preoperative evaluation is essential.
2. Renal cell carcinoma patients may bleed more than others. Assure adequate vascular access including large peripheral iv and central venous catheter. Make sure to have an adequate supply on blood products available.
3. Don't advance guidewires and central venous catheters below the superior vena cava - atrial junction. There is a high risk for tumor embolism with potentially fatal pulmonary embolism.
4. Do not float a pulmonary artery catheter through the right heart containing tumor masses. There is a high risk for tumor embolism with potentially fatal pulmonary embolism. Use an alternative technique if measurements of preload/afterload/cardiac output are required (i.e. TEE, esophageal Doppler probes or endtidal CO2 loops)
5. Plan to use perioperative transesophageal echocardiography. The TEE allows monitoring the intracardiac mass, facilitates the confirmation of the position of the CVC tip(s), and provides guidance for the insertion of

the cannulas for cardiopulmonary bypass.

6. Some of the advantages of using intraoperative TEE are

7. Be prepared to initiate cardiopulmonary bypass for pulmonary embolectomy at any time when manipulating the tumor mass in the IVC.

8. Good perioperative teamwork and communication between urology, cardiothoracic surgery, perfusionists, nursing, interventional radiology, blood bank and anesthesiology is essential for success.

References

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