



Anaesthesiology

A CASE OF RENAL CELL CARCINOMA WITH INFERIOR VENA CAVA EXTENSION.

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ABSTRACT

Renal cell carcinoma (RCC) is a tumor which has a very insidious onset and mostly it presents very late in the course when it has already invaded local structures. Here we have discussed in detail, the anesthetic management of a case of RCC with IVC extension.

KEYWORDS : Renal cell carcinoma, IVC extension, interesting case.

CASE REPORT

A 69 year old male patient resident of Kullu, Himachal Pradesh was admitted in our hospital with complaint of painful hematuria for 10 days.

History of presenting complaint :

- Apparently allright one month back.
- Symptoms started as low back pain on right side with tiredness and loss of appetite.
- Noticed blood in urine 10+ days back; passage of clots along with blood; associated with pain abdomen which is moderate to severe in intensity in lower part of abdomen with no aggravating or relieving factors.
- No other positive history.

- **Past history :** Known case of systemic hypertension for three years. Controlled by medications. No other medical or surgical illness in the past.
- **Drug history :** On Tab. Amlodipine 5mg + Tab. Hydrochlorothiazide 12.5 mg once daily for systemic hypertension for past three years. Tab. Ecospirin 75mg prophylactically for past three years; stopped three days back.
- **Personal history :** Non smoker, Social drinker, Non vegetarian, Married.
- **Family history :** Not significant.
- **Allergic history :** Not significant.

General Examination :

- Conscious, oriented
- Well built and nourished
- No pallor, Icterus, clubbing, cyanosis, lymphadenopathy, edema.
- Vitals : BP – 118/70 mmHg. PR – 68 bpm. RR – 14 per minute. Temp – afebrile.

Systemic examination :

- Cardiovascular system : WNL
- Respiratory system : WNL
- Gastrointestinal System : Lump 3x3 cm present in right iliac region
- Central nervous system : WNL

Provisional Diagnosis : Right renal cell carcinoma

Baseline investigations :

- Hb : 15.7 mg/dL
- RBC : 3.66 Lakh per microL
- TC : 7400 /microL
- DC : N87, E01, L10, M02
- Platelets : 390000/microL
- RBS : 109 mg/dL
- CXR : WNL
- ECG : WNL
- BT : 58 sec
- Na : 126 meq/L
- K : 3.7 meq/L
- Cl : 86 meq/L
- BUN : 26 mg/dL
- Creat : 1.1 mg/dL
- T.Prot : 7.2 mg/dL
- Albumin : 4.1 mg/dL

- Calcium : 8.1 mg/dL
- CT : 3min 48sec
- Urine Cytology : Negative

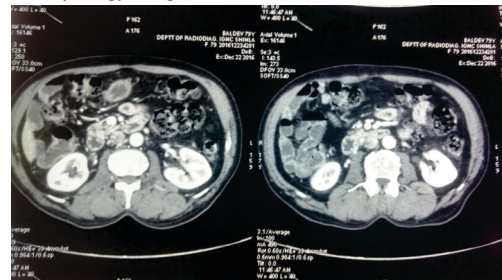


Figure 1: CECT abdomen.

- **CECT Report :** Heterogeneously enhancing mass in relation to upper pole of right kidney, infiltrating into right renal vein & IVC and right upper pole calyx with perinephric stranding suggestive of renal cell carcinoma stage III b.

Final Diagnosis :

Renal cell carcinoma stage III b with BPH Grade I with systemic Hypertension

Pre-anaesthetic evaluation

- No h/o URI, fever, SOB.
- No history suggestive of any acute illness.
- H/o hypertension on treatment – controlled.
- Patient was on T. Aspirin 75mg – stopped 3 days back.
- Vitals : BP-118/70 ; HR-68 ; RR-16 ; Temp-Afeb .
- No pallor or cyanosis.
- Allens test : negative
- Systemic examination : WNL
- Airway Assesment : WNL
- Preop investigations : Hb-15.7, PLT-390000, RBS-97, Na-124, K-4.2, Cl-85.
- CXR and ECG : WNL
- Repeat Na-136, Cl-92
- Pulmonary function test : Mild restriction
- Medicine/Nephrology clearance : obtained

Monitoring

- SpO₂
- ECG
- IBP
- NIBP
- EtCO₂
- CVP

Anaesthesia

- Preoxygenation with 100% O₂ x 3 min
- PAM : In. Glycopyrrolate 0.2mg IV + Inj. Ondansetron 4mg IV + Inj. Fentanyl 100mcg IV
- Induction : Inj. Propofol 120mg IV + Inj. Succinyl choline 100mg IV + IPPV
- Endotracheal Intubation with 8mm CoETT under DLS
- MOA : O₂ : N₂O : Halothane = 33% : 66% : 0-1%
- Inj. Atracurium 20mg IV + 5mg IV SOS
- Inj. Morphine 7.5mg IV

- REV : Inj.Glycopyrrolate 0.5mg + Inj.Neostigmine 2.5mg IV

Surgical procedure

- Supine position
- Transperitoneal anterior subcostal incision (Chevron Incision)
- Peritoneal cavity is entered
- Intra-abdominal contents are inspected for any evidence of metastatic disease.
- The peritoneal reflection is incised along the line of Toldt, thus mobilizing the ascending and descending colon.
- Vena cava is use as a reference landmark
- Tumor involving upper pole of the right kidney, 3 x 4 cm in size.
- The renal vein is palpated for any firmness that suggests a tumor thrombus, there was a thrombus on the right renal vein extending into infrahepatic portion of IVC
- No adhesions between growth and IVC or surrounding structures
- Gonadal vein, renal artery, renal vein, short adrenal veins – ligated and divided sequentially.
- Vascular clamp is placed at the junction of renal vein and IVC.
- The ureter and gonadal vein are mobilized bluntly to the level of bifurcation of the aorta
- The upper pole of the kidney is pulled down to expose the adrenal gland.
- The kidney is removed en bloc with adrenal from the retroperitoneum
- Regional lymphadenectomy done
- The defect in the mesocolon is closed to prevent internal hernias.
- Hemostasis achieved, Drains are put
- Wound closed in layers.



Figure 2: Chevron incision

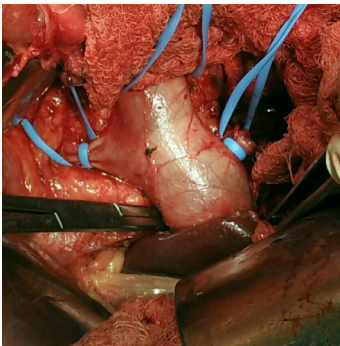


Figure 3: Intraop ligature of vasculature.

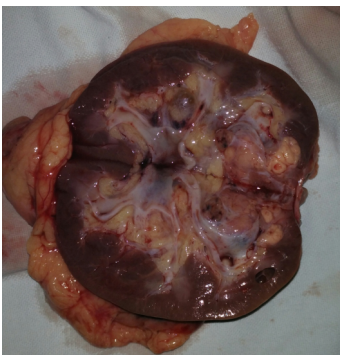


Figure 4: Postoperative picture of resected kidney.

Intra operative anaesthetic management

- Epidural catheter placement for postoperative analgesia is not done in view of recent use of Aspirin
- Fresh blood units were already arranged made available preop.
- Accurate fluid requirements calculated and administered accordingly via two peripheral intravenous catheters with 16G and 18G cannula.
- Continuous BP monitoring done via left Radial artery cannulation.
- Central line inserted after Induction.
- Patient was covered with cotton pads and warm blankets to prevent hypothermia.
- Adequate depth of Anaesthesia is maintained throughout surgery.
- Analgesia is maintained with opioids.
- Hypotension during IVC manipulation managed by 30 degree head down position and judicious administration of Crystalloids. No inotropic support needed. MAP is maintained above 65mmHg throughout surgery.
- Intraop blood loss was around 1200mL; one unit of fresh whole blood transfused intraoperatively.
- Smooth extubation was planned and performed.

Postoperative concerns

- Secondary hemorrhage from the renal pedicle or any unrecognized injury.
- Atelectasis
- Ileus
- Both superficial and deep wound infections.
- Temporary or permanent renal failure, and incisional hernia.
- Myocardial infarction.
- Congestive heart failure.
- Pulmonary embolism,
- Cerebrovascular accident
- Pneumonia.
- Thrombophlebitis

DISCUSSION

Renal Cell Carcinoma

- Most common type of kidney cancer.
- About 9 out of 10 kidney cancers
- Usually grows as a single tumor within a kidney,
- sometimes there are 2 or more tumors in one kidney or even tumors in both kidneys at the same time.

Subtypes of RCC¹

1. Clear cell renal cell carcinoma : most common form.
2. Papillary renal cell carcinoma : second most common (chromophilic tumors).
3. Chromophobe renal cell carcinoma : like the clear cells, but are much larger.
4. Collecting duct RCC
5. Multilocular cystic RCC
6. Medullary carcinoma
7. Mucinous tubular and spindle cell carcinoma
8. Neuroblastoma-associated RCC
9. Unclassified renal cell carcinoma

Other types of kidney cancers :

- transitional cell carcinomas
- Wilms tumors
- renal sarcomas.

Benign (non-cancerous) kidney tumors :

- Renal adenoma,
- Oncocytoma,
- Angiomyolipoma.
- Paraneoplastic syndromes : erythrocytosis, hypercalcemia, hypertension, and nonmetastatic hepatic dysfunction.
- The classic triad : hematuria, flank pain, and palpable mass

Signs and symptoms

- Early kidney cancers do not usually cause any signs or symptoms.
- Blood in the urine (hematuria)
- Low back pain on one side (not caused by injury)
- A mass (lump) on the side or lower back
- Fatigue (tiredness)
- Loss of appetite
- Weight loss not caused by dieting
- Fever that is not caused by an infection and that doesn't go away

- Anemia

Preoperative evaluation

- Defining the degree of renal impairment
- Searching for the presence of coexisting systemic diseases
- Preexisting renal impairment depends upon tumor size in the affected kidney as well as underlying systemic disorders such as hypertension and diabetes.
- Smoking is a well established risk factor for renal carcinoma, and these patients have a high incidence of underlying coronary artery and chronic obstructive lung disease.
- Although some patients present with erythrocytosis, the majority are anemic.
- Preoperative blood transfusion to increase hemoglobin concentration above 10 g/dL should be considered when a large tumor mass is to be resected.

Anaesthetic considerations

- Potential for extensive blood loss.
- Direct arterial pressure monitoring.
- Central venous cannulation - pressure monitoring and rapid transfusion.
- TEE - considered for all patients with extensive vena cava thrombus.
- Retraction of the inferior vena cava - transient arterial hypotension.
- Only brief periods of controlled hypotension should be used to reduce blood loss because of its potential to impair function in the contralateral kidney.
- Reflex renal vasoconstriction in the unaffected kidney can also result in postoperative renal dysfunction.
- Fluid replacement should be sufficient to maintain urinary output greater than 0.5 mL/kg/h.
- Intraoperative transesophageal echocardiography (TEE) is helpful in determining whether the uppermost margin of the tumor thrombus extends to the diaphragm, above the diaphragm, into the right atrium, or to the tricuspid valve.
- RCC is associated with high morbidity and mortality.
- Despite significant improvements in surgical techniques and perioperative care, the 5-year overall survival remains only between 32% and 69%, highlighting the adverse prognosis of such locally advanced tumours.
- For IVC tumour thrombus levels I to IV, adverse event rates were noted as 18%, 20%, 26% and 47%, respectively.
- Among the most frequent complications were haemorrhage (3.0%), pulmonary embolism (2.7%), wound infection (2.6%), acute renal failure (1.8%), ileus (5.3%), and the need for additional surgery (3.6%).
- Radical nephrectomy with IVC thrombectomy is a detailed and potentially complicated procedure with significant risk of morbidity and mortality requiring the need for good communication between urology, anaesthesiology, and other ancillary surgical disciplines if required.

Management of large thrombus (level II or III)

- Invasive pressure monitoring and multiple large-bore intravenous catheters
- Transfusion requirements are commonly 10–15 units of packed red blood cells. Transfusion of platelets, fresh frozen plasma, and cryoprecipitate may also be required.
- Problems associated with massive blood transfusion.
- Central venous catheterization should be performed cautiously to prevent dislodgement and embolization of tumor thrombus. A high central venous pressure is typical in the setting of significant caval thrombus and reflects the degree of venous obstruction.

Management of Complete obstruction of the IVC²

- Markedly increases operative blood loss because of dilated venous collaterals from the lower body that traverse the abdominal wall, retroperitoneum, and epidural space.
- Potentially catastrophic intraoperative pulmonary embolization of the tumor.
- Tumor embolization may be heralded by sudden supraventricular arrhythmias, arterial desaturation, and profound systemic hypotension. IOC – TEE.
- Cardiopulmonary bypass may be used when the tumor occupies more than 40% of the right atrium and cannot be pulled back into the cava.

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