A DEATH ON SURGICAL TABLE DUE TO RENAL TUMOR EMBOLISM

- A Case Report -

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A 45 year old farmer from a remote area of Sri Lanka was referred from the local hospital to the Surgical Clinic at the CSTH. He complained of fullness of the left side of the abdomen, left loin and lower back pain and painless haematuria for the past three years.

On physical examination, a non-tender ballotable mass was detected in the left lumbar region. Ultra sound scan revealed a diffuse ill-defined mass involving the hilum and the upper pole of the left kidney. CT revealed a tumor originating from the left kidney involving the upper pole, hilum, perenephric fat and extending through the right renal vein in to the inferior vena cava up to 4cm above the junction of the left renal vein. Provisional diagnosis of renal cell carcinoma was made and surgery for removal of the left kidney through abdominal approach was planned. Written informed consent was obtained after explaining to the patient of the possible complications. Pre-surgical assessment by the consultant anaesthetist revealed no contraindications for a major surgery, though he was found to be hypertensive throughout hospital stay.

Surgery was carried out by the consultant surgeon and his senior registrar. The consultant anaesthetist was incharge of the patient.

A highly vascular and irregular mass involving the upper part of the left kidney and perenephric fat was detected. After successful nephrectomy had been carried out, the patient suddenly became haemodynamically unstable and went in to cardiac arrest. The surgical team clinically suspected pulmonary embolism.

While cardio-pulmonary resuscitation had been continued by the consultant anesthetist, the surgeon started a midline thoracotomy to approach the right side of the heart. Another consultant surgeon was called for assistance. Upon opening in to the right ventricle and the pulmonary trunk, an irregular embolus obstructing the main pulmonary trunk was detected. The proximal portion of the embolus had been removed. The surgery lasted for nearly four hours. Despite resuscitation the patient died on the table. An inquest had been requested. The medico-legal autopsy had been performed by a consultant forensic pathologist.

Autopsy findings

The body was that of an averagely built, middle aged male with a surgical incision extending from the suprasternal notch to pubis. The body as well as the surgical specimen of the excised kidney had been examined during the autopsy.

The excised kidney was irregular and enlarged measuring 18x09 cm. The bisected specimen showed the hilum and the upper pole as well as several other areas extensively infiltrated by a soft, friable, purplish, vascular tumor which also has spreaded in to the renal vein. The careful dissection of the body revealed remnants of the tumor in the left renal vein and the lower part of the inferior vena cava above the renal veins.

Cardiac dissection revealed a saddle thrombus obstructing the distal pulmonary trunk and its bifurcation. Meticulous dissection of the broncho pulmonary tree of both lungs did not show any macroscopic abnormality. Histology of the left kidney revealed a clear cell carcinoma. Histology

of the impacted material in the pulmonary trunk revealed a tumor embolus of renal cell carcinoma with same cytological feature of the tumor found in the left kidney. Other organs of the body were macroscopically unremarkable and histologically the other kidney showed early evidence of systaemic hypertension. Deep veins of the lower limbs and the pelvis were devoid of thrombi.

Discussion

Benign tumors of the kidney are rare. Renal Cell Carcinoma (RCC) is the commonest of the tumors of the kidney in adults. It accounts for 70% of the renal tumors and nearly 85% of renal malignancy in adults. It arises from proximal tubular cells. Out of the many types, Clear Cell Carcinoma (CCC) is the commonest which accounts for 70% of RCC. Hereditary RCC tend to be bi-lateral whilst less than 2% of sporadic cases are bilateral.

RCC shows a male preponderance. Peak incidence is between 60-80 years. Advancing age, male sex, smoking, obesity, hypertension, long term dialysis, certain genetic factors, Von Hippel Lindau Syndrome, tuberous sclerosis, exposure to asbestos, petroleum products and heavy metals like Cadmium and working with coke ovens are some recognized risk factors. **(1)**

Only 10% of the patients present with the classical triad of haematuria, loin pain and abdominal mass. The more common presentations are hypertension, cachexia, weight loss, pyrexia of unknown origin, fatigue, peripheral oedema and features of paraneoplastic syndrome. Around 25-30% of patients present with symptoms of metastatic disease.

RCC spreads to adjacent structures including adrenal gland, liver, spleen, colon, pancreas and local lymph nodes. It may also extend to the renal vein and inferior vena cava. Cannon ball secondaries in the lungs are the commonest metastatic presentation. Secondaries of RCC produce osteolytic lesions.

Surgery is the gold stand of treatment with or without radiotherapy and chemotherapy. This depends on the staging of the tumor based on TNM 2002 system recommended by the European Guidelines. **(2)** Radical nephrectomy of the tumor-bearing kidney is the surgery of choice for unilateral localized RCC while extended lymphadenectomy in selected cases might improve the prognosis. Nephron sparing surgery, laparoscopic surgery, image guided percutaneous radio frequency ablation, cryoablation, microwave ablation, lacer ablation, high intensity focal ultrasound ablation etc. are other approaches with specific clinical indications. Tumor embolisation has limited indications. It has been recognized that there is no benefit in performing tumor embolisation before radical nephrectomy.

Prognosis depends on anatomical, histological and molecular factors. Overall 5 year survival is approximately 60%. Yet the actual prognosis in a given case depends greatly on the staging and the grading of the tumor at the time of diagnosis.

With reference to this particular patient, his age of presentation was fairly early than the majority of the cases. Probing in to his past medical, social, family and occupational history could not delineate any recognized risk factors other than the male sex. His mode of presentation with abdominal mass, loin pain and haematuria fell in to the 10% minority of so called "classical presentation". As there was no recorded history of hypertension before being referred to CSTH, it is difficult to conclude whether systaemic hypertension is an effect of the renal tumor.

Full range of imaging and other investigations successfully excluded metastatic disease or pre surgical pulmonary embolism. Renal vein involvement and extension in to infra diaphragmatic inferior vena cava was evident in this patient which is said to occur approximately in 33% and 6% of patients respectively. **(3)** Massive pulmonary embolism though it occurs relatively rarely, is a major hazard which has resulted in numerous deaths, especially during

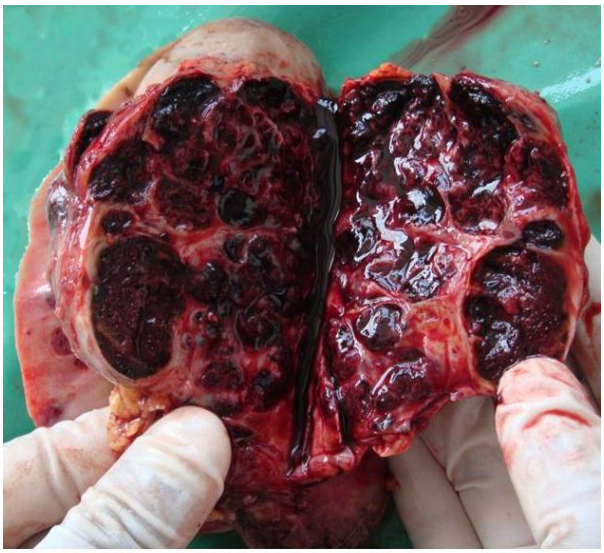
induction of anaesthesia and resection. **(4)(9)** The mortality of massive pulmonary tumor embolism is high and reported cases of successful management are few. Daughtry and associates report the first successful removal of such embolus in 1977. **(5)** Few successful cases of emergency pulmonary embolectomy during radical nephrectomy have been reported in the literature. **(6)(7)** Application of temporary venacaval filters to prevent fatal pulmonary embolism during nephrectomy had been tried by several authorities with promising results. Our patient did not have detectable tumor emboli prior to surgery and the embolisation occurred during the surgery which proved to be fatal.

MRI had been used for preoperative staging of RCC and according to one such classification this patient conforms with the Level ii,(also called Level B) where there is caval extension of the tumor more than 2cm above the renal vein but not within the intrahepatic vena cava. **(8)** Sudden haemodynamic instability and cardiac arrest of the patient could well be attributed to the extensive size of the saddle thrombus and the suddenness of its occurrence. The same explains the near normal macroscopic appearance of the lungs at the autopsy and the absence of histological evidence of emboli in lung samples. It also to a reasonable degree, excludes previous tumor embolism during life. Dissection of the deep veins of lower limbs and pelvis was helpful to exclude concomitant deep venous thrombosis and any possibility of such embolism.

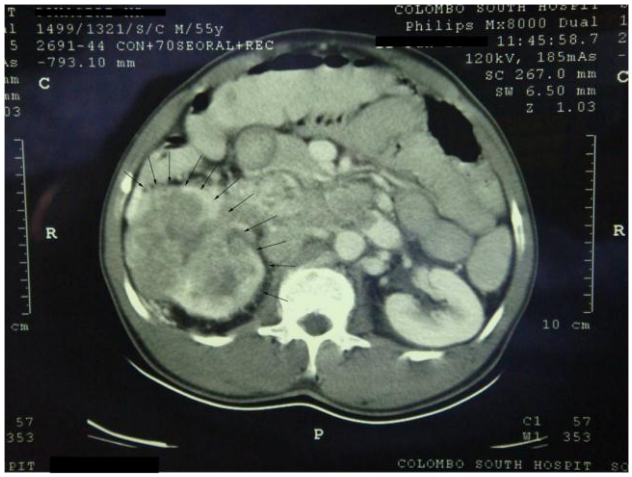
Conclusion

This case elaborates the rare incidence of a death of a 45 year old male due to pulmonary embolism of a renal cell carcinoma during nephrectomy. The medico legal autopsy helped in arriving at the definitive cause of death as well as allaying the anxiety of the relatives of the deceased about the issues associated with intraoperative death and thereby exonerating the surgical team who had done their best to save the life of the patient under the given circumstances. Death following pulmonary tumor embolism is a recognized yet fairly uncommon outcome of renal cell carcinoma.

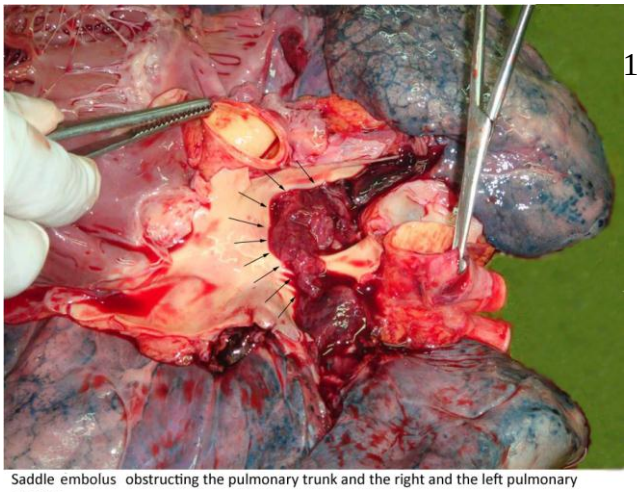
Kidney after removal of the capsule, showing an irregular mass in the upper pole



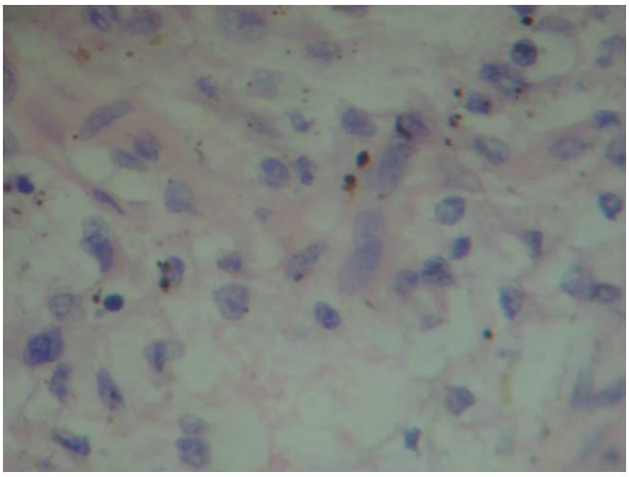
A section through the tumour- note the irregualr, highly vascular, dark red appearance



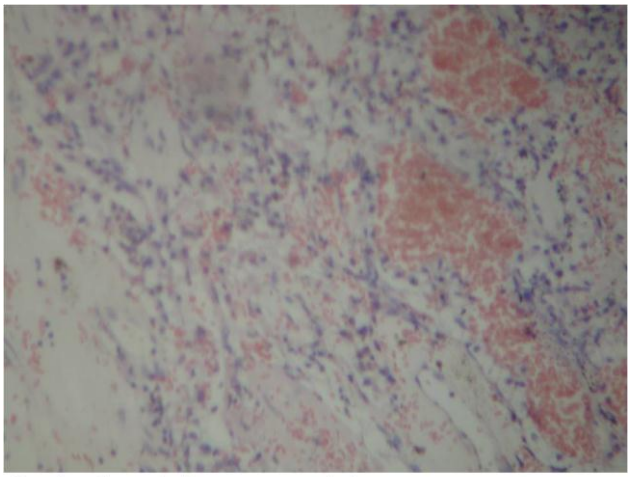
CT showing the involvement of the left kidney



Saddle embolus obstructing the pulmonary trunk and the right and the left pulmonary arteries



Finer details showing the clear cells



Section through the tumour embolus

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