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Case Report

Perioperative management of a patient with renal cell carcinoma and polycythaemia

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Case report

A 63-year old man who developed right orchitis was found to have a ballottable mass in the right loin. There was no loin pain or haematuria. Abdominal ultrasonography revealed a right renal mass. The CT abdomen showed a large mass in the right kidney suggestive of renal cell carcinoma. The renal vein and perirenal lymph nodes were normal. Liver and lungs did not show metastases. He was scheduled for right radical nephrectomy. Routine pre operative investigations showed his haemoglobin to be 23.2 g/dl (haematocrit – 65.0%). The repeat haemoglobin value was 23.0 g/dl (haematocrit – 64.6%). He had been living in Horana throughout his life and was a non-smoker. The full blood count, blood picture and clotting profile were normal, apart from the high haemoglobin content. A tentative diagnosis of polycythaemia secondary to the renal neoplasm was made.

It was decided to perform pre-operative venesection to avoid intra and post-operative complications that can occur in a patient with polycythaemia undergoing surgery. One litre of blood was removed over 2 hours, while maintaining a pressure of 100 mmHg in a cuff across the arm. During the venesection 1 litre of crystalloids (0.9% saline) was infused and blood pressure was monitored. The haemoglobin was 19 g/dl next day. Therefore another 500 ml of blood was removed under similar conditions. Subsequently haemoglobin was 16.0 g/dl (haematocrit 46.4). Two days later right radical nephrectomy was done (Figure). Two hours before induction of anaesthesia, enoxaparin 20 mg was given subcutaneously and was repeated daily for three days until the patient became fully mobile. The blood loss was 800 ml and the post-operative haemoglobin was 14.9 g/dl.

One month later when he was seen at the clinic the haemoglobin was 16.0 g/dl. One year after the surgery the haemoglobin was 13.3 g/dl.

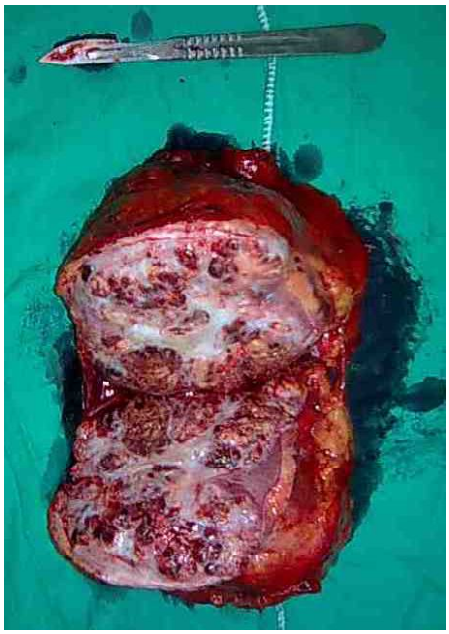

Figure. *Nephrectomy specimen with the large tumour.*

Discussion

Polycythaemia is a condition in which there is an increase in the proportion of blood volume that is occupied by red blood cells, which is measured as the haematocrit. In polycythaemia, haematocrit is more than 52% in males and 47% in females (1). Polycythaemia could be absolute or relative. In relative polycythaemia, plasma volume is depleted relative to the red cell mass. Absolute polycythaemia could result from many causes.

In this patient the probable cause for absolute polycythaemia was excess erythropoietin production from the renal cell carcinoma. Signalling by erythropoietin is increasingly recognised as a relevant mechanism in tumour biology, potentially leading to enhanced proliferation, angiogenesis and therapy resistance. Paraneoplastic polycythaemia by cancerous overproduction of erythropoietin is a rare event but

most frequently seen in patients with renal cell carcinoma. Majority of clear cell carcinoma displays a strong activation of the transcription factor regulating erythropoietin, the hypoxia-inducible factor (2). Erythropoietin gene expression in renal cell carcinoma is considerably more frequent than paraneoplastic polycythaemia. It is unclear why only a small minority of patients with renal cell carcinoma develop polycythaemia. Whether this has any prognostic significance is uncertain.

The important complications anticipated in patients with polycythaemia during anaesthesia and surgery are thrombo-embolic phenomena and paradoxical bleeding tendency. History and examination of this patient revealed no clinical manifestations of these complications. His prothrombin time, activated partial thromboplastin time and platelet count were normal.

The oxygen delivery is optimal at a haematocrit of 40-45% (3). The cerebral oxygenation improves in man when haematocrit is kept below 45% (1). Therefore a haematocrit below 50% is preferable prior to surgery. This can be achieved by repetitive venesection as appropriate. The volume of blood that can be removed at one session of venesection is 10 ml/kg body weight over a period of 45 minutes to one hour. During venesection a similar volume of crystalloids are infused to maintain the normovolaemic status.

Radical nephrectomy is a major operation with a potential to bleed excessively. Hence it would be useful if we can use the stored venesected blood as an autotransfusion in case of excessive haemorrhage during surgery. However, this is not recommended in patients with malignancies, though this has not been evaluated critically in a scientific study.

Patients with polycythaemia are prone to thromboembolic phenomena. Hence deep vein prophylaxis is important in these patients. As the patient was started on prophylactic subcutaneous low-molecular weight heparin 2 hours before the commencement of surgery, epidural analgesia was not offered. However, if the low molecular weight heparin can be started 12 hours before the scheduled time for surgery an epidural catheter can be inserted with safety.

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