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Case Report

Renal Arteries Embolization in Unresectable Clear Cell Renal Carcinoma: First Time Experience at Haji Adam Malik Hospital

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Keywords: renal arterial embolisation; renal tumour; case report; Indonesia

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Abstract

OBJECTIVE: To report a case of renal arterial embolisation (RAE) in unresectable renal tumour before nephrectomy.

CASE REPORT: On presentation, the clinical features of this patient, including medical history, signs and symptoms, imaging examinations were recorded. After diagnosis and initial treatment, the result and histopathological examination were performed and discussed. We performed RAE in the unresectable renal tumour in the 28-year-old male that was complaining a palpable pain right flank mass and intermittent hematuria that had been observed five months earlier. A month after RAE, the tumour shrinks and become resectable. The parameter used was tumour volume, propulsion and component, with subjective value VAS, hematuria symptom and Quality Of Life Score EORTC-QLQ C30. The next step we performed nephrectomy with histopathology results in Clear Cell Renal Carcinoma (CCRC).

CONCLUSION: RAE is an effective therapeutic and adjuvant tool because it facilitates the dissection of unresectable large renal tumours and tumours with extensive involvement around the renal hilum; it leading to lower overall morbidity. However, the lack of randomised prospective studies is the primary reason that RAE is not used often before surgery.

Introduction

Renal cell carcinoma (RCC) constitutes approximately 90–95% of all kidney neoplasms, and 25–30% of all patients had metastatic disease upon its diagnosis. The incidence rates are high in the Czech Republic, and low in much of Africa and South-east Asia country [1]. In Indonesia, renal cell carcinoma was ranked 18th in both sexes for the overall incidence. It occurs in 1.4-1.8 cases per 100.000 populations [2].

Renal arterial embolisation (RAE) has been proven safe and effective in managing renal cancer for several decades of experience. This procedure was first performed in 1973 by Almgard [3]. Since then, the procedure has developed due to advances in technology and instrumentation. The main indication of RAE is preoperative infarction of renal cancer before nephrectomy. It can also be done as palliation therapy for unresectable renal cancer, symptomatic hematuria, and treatment of angiomyolipomas (AMLs), treatment for vascular malformations, correcting of complications following renal transplantation and treatment for patients who are poor for surgical candidates [4].

In our country, systemic therapy for renal cancer has not been covered by the national health insurance. Therefore, RAE can be a promising treatment option for renal cancer patients. The long-term outcome of RAE, however, remains unknown. In this case report, we described a patient with RCC who

underwent RAE as preoperative infarction of renal cancer before nephrectomy.

Case presentation

Previously 28-year-old man was admitted to the hospital with the chief complain of a palpable painful right flank mass. There was a history of intermittent hematuria that had been observed five months earlier. He also had a history of nausea and weight loss. The patient had no family history of a renal tumour. On physical examination, the patient looked pale. There was a mobile palpable mass in the right flank across the midline. The diameter was estimated to be more than 25cm. Urinalysis examination showed microscopic hematuria. We also performed upper lower abdominal CT scan for this patient who showed a huge mass in the right Kidney (Figure 1 and 2).

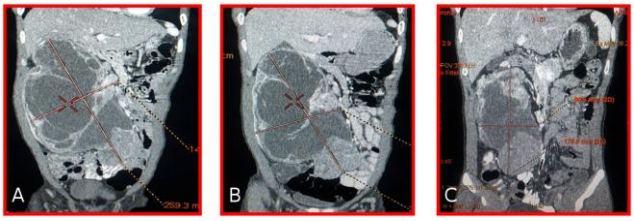

Figure 1: Abdominal CT Scan in coronal plane showed the tumour extent (1A) before RAE was performed, (1B) after 1st RAE performed, (C) after 2nd RAE performed, it shows that a tumour gradually decreased in size according to coronal view

We diagnosed this patient with unresectable Renal Tumor with grading T4BN1M0, with the extension of the lymph node in paracaval and interaortocaval without long distance metastatic, the tumour pressing through the midline and suspected compelling the aorta and inferior vena cava.

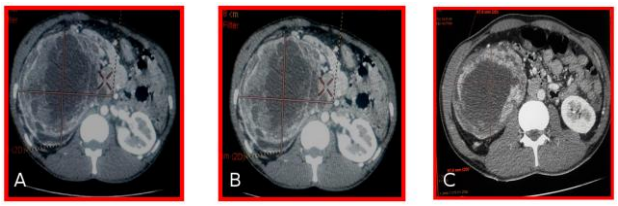

Figure 2: Abdominal CT Scan in axial plane showed the tumour extent (2A) before RAE performed, (2B) after 1st RAE performed, (C) after 2nd RAE performed, it shows that a tumour gradually decreased in size according to axial view

After the patient had signed the written informed consent, the patient was scheduled for the procedure. Under local anaesthesia, we performed arterial vascular access by inserting a vascular sheath (5 Fr-Simmon-shaped catheters) via the right common femoral artery (CFA). An aortography was then performed with a flush catheter which placed slightly superior to the expected origin of the renal arteries. Aortography is beneficial to evaluate renal arteries vascularisation and to determine, if present, the accessory renal arteries. Supplying tumour artery was selectively catheterised and embolize using polyvinyl alcohol (PVA). PVA 300-500 µm were exposed to the target using occlusion balloon catheter delivery technique.

Table 1: Tumor evaluation parameter

No.	Parameter	Before	After RAE 1st	After RAE 2nd
1	Tumor volume	2800 cc	2300cc	1700cc
2	Tumour aggravation	Across the midline, compelling the aorta and vena cava	Across the midline Compelling the aorta and vena cava	Not crossing the midline and compelling the aorta and vena cava
3	Tumor component	Cystic HU: 0-45	Necrotic (+) HU: 0-191	Necrotic (+) HU: 0-300
4	VAS	6-8	2-3	0
5	Hematuria	(+)	(-)	(-)
6	Quality of Life score measured by EORTC-QLQ C30	100	86	70

Note: HU = Hounsfield unit; VAS = Visual Analogue Score; EORTC-QLQ = European Organization for Research and Treatment of Cancer Quality of Life Questionnaire.

After the procedure was completed, the patient again undergoing aortography to evaluate the outcome of the procedure. In this patient, we performed RAE two times with further evaluation. Table 1, Figure 3 and Figure 4 show the tumour response after the first and second procedure. The parameter used was tumour volume, tumour aggravation and tumour component from the abdominal CT Scan, visual analogue score (VAS), the presence of hematuria and the patient quality of life measured by EORTC-QLQ C30.

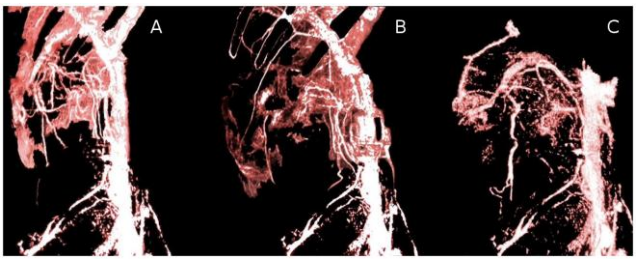

Figure 3: Abdominal CT Scan with vascular description in the 3D plane shows the vascular profile (3A) before RAE was performed, (3B) after 1st RAE, main renal artery was successfully blocked but remaining artery in inferior mesenteric and extrarenal collateral vascular supply cannot be blocked by RAE, (3C) after 2nd RAE was performed, it shows that tumor vascular supply in mesenteric inferior and collateral artery had minimized

After a month of evaluation, we performed nephrectomy with chevron incision in this patient. During the procedure, we found only small adhesion in anterior and inferior with the ileum and no adhesion in solid organ (Fig. 5). The total blood loss is 500 cc. No intraoperative transfusion is needed. The surgical specimen was then delivered to the pathology department. Histological analysis revealed a Clear Cell Renal Carcinoma (CRCC) (Fig. 6).

Discussion

CRCC is the most common and aggressive RCC subtype with the highest rates of local invasion-metastasis and mortality. It constitutes 70–80% of all renal cancers, these tumours are commonly yellow when they are bivalve and are highly vascular on microscopic examination. The type of CRCC can be a clear cell, granular cell or mixed type. In general, patients with clear cell RCC have a worse prognosis compared with papillary or chromophobe RCC, even after stratification for stage and grade [5] [6].

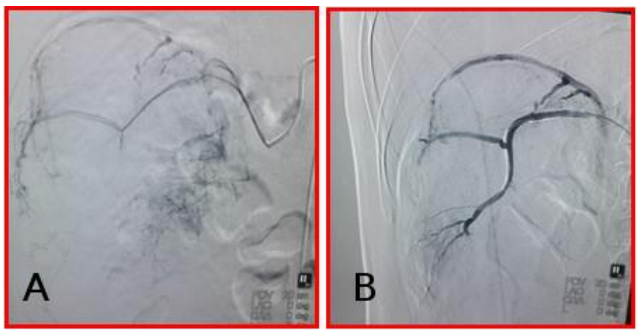

Figure 4: Fluoroscopy result shows (4A) first embolisation, (4B) second embolisation

RAE was first popularised by Almgard et al. In the 1970s, Almgard et al. performed occlusion treatment in 19 patients with three different diagnoses. Eleven cases were a large metastasising tumour, four cases were a large tumour without metastases, and the other four cases were troublesome haematuria. The method used was the same method that had been tested on animals two years earlier [3].

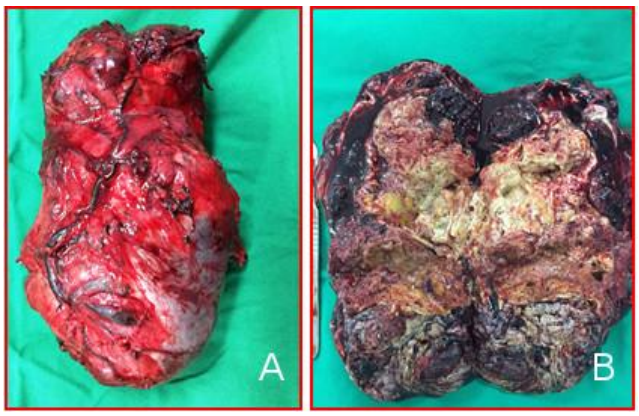

Figure 5: Tumor description after nephrectomy (5A) tumor with size 25cm x15 cm x 6 cm, (5B) tumor with midline dissection

At the first time, RAE was primarily used to treat unresectable symptomatic renal cancer. Currently, the indications for RAE have considerably expanded including renal trauma, renal tumours, iatrogenic complications, and medical renal disease [7] [8]. The advantages of RAE in the preoperative setting include a decrease in perioperative blood loss, the creation of a tissue plane of oedema, facilitating dissection, and reduction in tumour bulk including the extent of vascular thrombus [4].

Before performing the procedure, it is important to have sufficient knowledge of anatomy and its variations of renal vascularisation. Normally, a single renal artery arises from each left and right inferior side of the abdominal aorta at the level of the L1–L2 interspace. The main renal arteries branch into anterior and posterior divisions then continue as segmental, lobar, interlobar, and arcuate arteries. There are anatomical variations in more than 30% people, like the early division of the main renal arteries or extrarenal arteries further subdivided into accessory (hilar) or aberrant (polar) entry into the kidney [9].

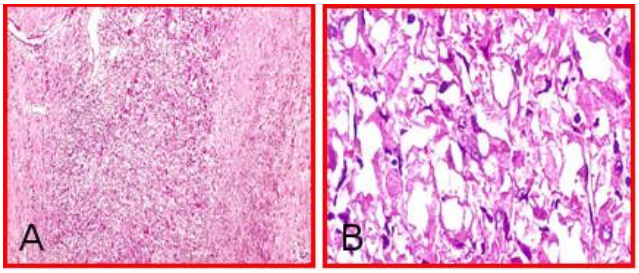

Figure 6: a) cRCC Histopathology is shown in a microscope with 20 x larger; b) The Blue Arrow Showed cRCC Histopathology in 40 x larger with clear arrow showed clear cytoplasmic with nuclei with irregular contour with Fuhrman Classification grade III

The common femoral artery (CFA) had been increasingly used as the preferred access site for renal arterial embolisation. The vascular access is generally performed using the 18 or 19-gauge puncture needles with the modified Seldinger puncture technique. In some cases where the access cannot be done through the CFA, the axillary or brachial arteries can be used as an alternative. The 5-French sheath used mostly to minimise the risk of access site bleeding. For selective embolisation of the renal arteries, some catheter can be used, including an RC-2 shaped catheter, SOS-shaped catheter, Cobra or Simmons-shaped catheter. There are some conditions that require special consideration for the sake of patient safety including atherosclerosis, abdominal aortic aneurysm, narrowing iliac artery, renal artery stenosis, or mass effect of a retroperitoneal tumour. In this patient, there are no such conditions [10] [11].

Renal tumours are typically hypervascular and often with extrarenal arterial involvement. Therefore, the alternative agent that can reach the small vessel and capillary bed occlusion is needed. In the literature, for kidney cancer cases, there is no specific agent recommended to have a better effectivity than others. In our institution, we use polyvinyl alcohol as embolant agent [12] [13]. Foam forms of PVA were first used in the 1970's [14]. The small amount of PVA for tumour embolisation may result in significant tissue ischemia. PVA is delivered

through the catheter in suspension form. PVA causes direct mechanical obstruction and induces a foreign body type reaction with the permeation of the particles by granulation tissue. Over time this reaction subsides, and months to years later, the vessel may recanalise. Although PVA is considered to be a permanent agent, it will recanalise over time [15].

Although this procedure is less invasive than open surgery, RAE has its share of complications, related to the procedure and the underlying pathology. The most common complication is a postembolization syndrome that affects over 90% of patients. It is defined as fever, mild flank pain, nausea, vomiting, paralytic ileus, and leucocytosis for one until three days after the procedure. Supportive treatment is often enough to resolve the symptoms. The other complications such as infection and coil migration are rare [16].

There are some limitations to this case report. The patient needs to be evaluated for a longer period. 1-year-follow-up is recommended to investigate any side effect of the procedure, relapse, or another progression. More subjects undergoing RAE should be investigated to obtain more significant outcomes.

In conclusion, RAE is an effective therapeutic and adjuvant tool because it facilitates the dissection of unresectable large renal tumour and tumour with extensive involvement in the renal hilum. It leads to lower overall morbidity and can also be a neoadjuvant treatment before radical nephrectomy. However, the lack of randomised prospective studies is the primary reason why RAE is still rarely used as premedication before surgery.

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