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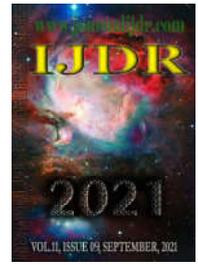
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CASE REPORT

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RENAL CANCER WITH TUMOR THROMBUS LEVEL IV: CASE REPORT

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ABSTRACT

Renal cell carcinoma (RCC) can be characterized as a neoplasm prone to extension to the venous system in the form of thrombus tumor, more frequently, when malignant, to the vena cava. The clinic is often nonspecific until the advanced stage of the disease, with a classic triad of flank pain, hematuria, and a palpable abdominal mass appearing in only 6-10% of cases. Non-invasive imaging exams play an increasingly important role. When there is associated tumor thrombus, curative therapy necessarily involves multidisciplinary surgical intervention, consisting in the removal of the kidney and tumor thrombus, and in particular situations cardiac intervention may be associated. In this paper we present the case of a 35-year-old man, oligosymptomatic, who was diagnosed with an incidental mass in the right kidney through urinary tract ultrasound. The diagnostic investigation was complemented with computed tomography and computed phlebography, confirming a solid lesion measuring 73x52x47mm, with invasion of the inferior vena cava and right atrium. The patient underwent right radical nephrectomy with excision of the thrombus from the inferior vena cava to the right atrium under cardiopulmonary bypass with deep hypothermic arrest. Histology revealed clear-type renal cell carcinoma. Surgery and postoperative uneventful. The patient remained in outpatient follow-up, with local recurrence 6 months after surgery. Being referred to clinical oncology and undergoing immunotherapy and chemotherapy, which is followed up.

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INTRODUCTION

Renal cell carcinomas (RCC), which originate in the renal cortex, constitute 2 to 3 percent of all malignant neoplasms and are the most lethal of all common urologic carcinomas, associated with 30 to 40 percent mortality. They represent 80 to 85% of primary renal neoplasms. Its etiology is related to exposure to environmental risk factors such as tobacco, obesity, hypertension, acquired cystic kidney disease, occupational exposure (oil derivatives, asbestos, cadmium) and use of NSAIDs, in addition to genetic factors, cytotoxic chemotherapy, chronic hepatitis C infection, sickle cell disease and nephrolithiasis (Hsieh, 2017). Regarding symptoms, they are usually asymptomatic in the initial phase and start to present some symptoms when they are somehow advanced.

Thus, more than 50% are diagnosed incidentally, and the remainder usually present with all or some symptom of the classic triad: flank abdominal pain, hematuria and a palpable mass. They may also have paraneoplastic syndromes or symptoms related to metastases. The presence of symptoms such as edema of the lower limbs, unilateral or non-reducible varicocele on the right, dilation of superficial abdominal veins, proteinuria, pulmonary embolism, mass in the right atrium or non-functioning of the suspected kidney should be suspected of a tumoral venous thrombus (Lardas, 2015). The RCC has the particularity of intraluminal growth in the venous system, designating itself as a tumoral venous thrombus. This involvement with the venous system occurs in 4 to 10% of RCCs and may be confined to the renal vein or extend to the inferior vena cava even to the right atrium. When it invades the inferior vena cava, it is divided into 4 levels: (Hevia, 2016).

Level 1: Adjacent to the renal vein ostium

Level 2: To the lower limit of the liver.

Level 3: Occupying the infradiaphragmatic portion of the inferior vena cava, including the intrahepatic portion.

Level 4: Occupying the supradiaphragmatic portion of the inferior vena cava.

This paper describes the clinical case of a patient with renal cell carcinoma associated with a level IV vena cava tumor thrombus, addressing aspects of epidemiology, pathology, diagnosis, classification, prognosis and surgical treatment, with an emphasis on the surgical technique and its particularities depending on the cephalic level reached by the venous thrombus.

CASE REPORT

DBT, male, white, 35 years old, with right lumbar pain, “squeezing” type, radiating to the right flank and right iliac fossa, of moderate intensity, accompanied by fatigue on medium efforts, sporadic chest pain on inspiration deep right and increased ipsilateral scrotal volume. He reported smoking for 10 years/pack and comorbidities such as systemic arterial hypertension. Physical examination revealed obesity (BMI: 37.9), normal vital signs, globose abdomen, presence of collateral circulation in the flanks. On deep palpation, it was slightly painful at the level of the right flank and iliac fossa, where a hardened mass of approximately 8 cm was palpable, poorly delimited, mobile, and without signs of peritonitis. Regarding the genitalia, he presented a topical scrotum, with evident scrotal varices on the right (varicocele grade 3 on the right. Lower limbs swollen ++/4, painless to palpation, pulses present, and presence of lock up to the level of the knees, without signs of phlebothrombosis. Laboratory tests were normal and ultrasonography showed a heterogeneous mass measuring approximately 5.2 X 7.3 X 4.7 centimeters in the lower pole of the right kidney. Tomography of the abdomen and pelvis: Right kidney with an expansive lesion in its lower pole measuring 9.9 x 7.6 x 6.9 cm associated with a hypodense thrombus occupying almost all of the lumen of the inferior vena cava, extending from the level of the renal vein to the right atrium. Absence of lymph node enlargement. The patient underwent right radical nephrectomy associated with retroperitoneal lymphadenectomy. The cardiothoracic surgery team performed vena cava thrombectomy through sternotomy with exposure of the cardiac area and creation of extracorporeal circulation (ECC). Then, it continued with cooling the patient to 18° with total circulatory arrest and concomitant longitudinal venotomy, right atriotomy and total removal of the thrombus anterogradely associated with washing the vena cava with distilled water and suturing it. The patient was removed from CPB after 22 minutes and the chest and abdomen were closed. The surgical time was 420 minutes and there was intraoperative bleeding of 1200 ml and blood transfusion with 02 concentrates of red blood cells. Patient remained in the cardiovascular intensive care unit for 4 days. Receiving hospital discharge on the 6th PO. The anatomopathological examination of the specimen showed clear-type renal cell carcinoma, acinar and alveolar histological pattern, Fuhrman nuclear grade 2 with infiltration of the renal capsule and lymph nodes free of neoplasia (pT3bN0). The patient was followed up by the urology and clinical oncology team and 6 months after surgery he presented metastasis in retroperitoneal lymph nodes and lung lesions, and chemotherapy was performed with nivolumab and ipilimumab. He is currently being treated with clinical oncology, currently using pazopanib in good general condition with controlled disease.

DISCUSSION

Venous involvement tumors are often malignant and may originate in the vein itself, extend into its lumen in the form of thrombi, or result from the invasion of neoplasms in adjacent organs (Lardas, 2015). In renal cell tumors with associated tumor thrombus, surgical

intervention with removal of the kidney and thrombus is the only approach that has been shown to be effective for more than 30 years (Hevia, 2016). Surgery can be performed with curative intent or for debulking, in cases of localized disease or advanced disease, respectively. In these cases, it can be complemented with systemic therapy and both with pulmonary embolism prophylaxis (Cheng Peng, 2018). Starting with clinical practice, what usually determines the surgical strategy is the extension of the tumor thrombus. The approach can be by median laparotomy, bilateral subcostal incision (Chévron), inverted T incision or prolonged lumboabdominal incision in S, which is possible to be associated with median sternotomy or right thoracotomy to access the cardiac area and the right atrium (Cheng Peng, 2018).

Type I thrombus: < 2cm above the renal vein: In the case on the right, a Kocher maneuver is chosen, exposing the vena cava and right renal vein. To the left, the posterior peritoneum and splenorenal ligament are sectioned, dislocating the descending colon in a medial inferior direction and the pancreas and spleen in a medial and superior direction (Hevia, 2016). First, the renal artery must be embolized, if this is not possible, it must first be ligated. Following the nephrectomy and only after it, the distal inferior vena cava, the contralateral renal vein and the proximal inferior vena cava are clamped, and then venotomy is performed with extraction of the tumor thrombus. In certain cases, it may be necessary to resect the inferior vena cava (IVC) follow-up with prosthesis interposition. An alternative technique consists of dislocating the thrombus by pushing it into the renal vein and then clamping it. In this way, the interruption of the flow from the contralateral renal vein can be avoided, although some authors are against the manipulation of the tumor thrombus in the IVC before clamping it. Thrombi in this portion of the IVC do not require liver mobilization and do not affect the patient's condition hemodynamically (Cheng Peng, 2018)

Type II thrombus: > 2 cm above the renal vein, below the hepatic veins: If the thrombus is located in the retrohepatic portion of the IVC, it may be necessary to mobilize the liver for adequate exposure and vascular control (Hevia, 2016). Due to the abundant collateral circulation caused by chronic obstruction of the IVC, liver mobilization must be careful and usually with difficulty. It is necessary to separate the vena cava from the liver, with ligatures of the collateral veins and isolation of the inferior vena cava posteriorly (Cheng Peng, 2018). Sequential clamping involves the infrarenal IVC, contralateral renal vein and IVC between the origin of the hepatic veins and the cephalic limit of the thrombus. After clamping, venotomy and thrombectomy are continued. IVC filter implantation below the suprahepatic veins is advisable to prevent pulmonary embolism (Cheng Peng, 2018).

Type III thrombus: thrombus at or above the hepatic veins and below the diaphragm

The liver must be mobilized exposing the retrohepatic IVC completely and subsequently clamping the hepatic pedicle (Pringle's maneuver), then clamping the infrarenal, renal contralateral and suprahepatic IVC, then performing the venotomy and thrombus extraction (Cheng Peng, 2018). Another method is to “push” the thrombus to the portion below the hepatic veins, and then clamp below these veins. In this way, a continuous drainage of the hepatic veins is achieved, not harming the venous return to the heart so much. In this case, intraoperative echographic control is important to identify the proximal and distal limits of the thrombus (Andrea Benedetto Galosi, 2021). There are still authors who guide the preparation of the femoral and axillary areas in case a venovenous bypass is necessary. The moment of greatest risk of hemodynamic changes is cavotomy and thrombectomy, and to avoid these sudden changes in clamping of the IVC, an evaluation of the cross-clamping effect of the IVC is suggested before proceeding to the cavotomy. Bearing in mind that this effect becomes more evident when clamping is performed in a totally unobstructed vein, right after the chronic obstruction by the thrombus, sufficient collateral circulations are

already established for the maneuver to be performed without many hemodynamic complications (Andrea Benedetto Galosi, 2021).

Table 1. Classification of IVC (inferior vena cava) tumors into types

Types	
Primary:	Secondaries that can be associated with tumor thrombi:
IVC leiomyosarcoma	Renal cell carcinoma
Hemangioendothelioma	Pheochromocytoma
Secondaries:	Adrenocortical carcinoma
Retroperitoneal soft tissue tumors	Extra-skeletal Ewing's Sarcoma
Liposarcoma	Uterine sarcomas
Leiomyosarcoma	Leiomyomatosis
Malignant fibrous histiocytoma	Endometrial stromal cells
Liver tumors	Germ cell tumors
Cholangiocarcinoma	Embryonic
Hepatocellular carcinoma	Teratocarcinoma
Metastatic (example: colorectal)	Seminoma
Pancreaticoduodenal tumors	

In case of intolerance to IVC clamping, venovenous or cardiopulmonary bypass techniques are used with total cardiac arrest and deep hypothermia at 18°C. However, classical techniques are preferred.

Type IV: thrombus above the diaphragm

In this case, the patient in question and the technique used for his surgical approach are included (Cheng Peng, 2018). In these types of tumors, a cardiopulmonary bypass is used, and an intraoperative transesophageal echocardiography is usually required, which is not available at the service in question, so a phlebography is performed the day before the procedure. This instrument helps in the intraoperative verification of the extension, mobility and confirmation of the total removal of the thrombus (Hevia, 2016). In this case report, according to other literatures, when a thrombus with a hard and homogeneous appearance is observed in the previous imaging exam, intraoperative transesophageal ultrasound can be dispensed with and "push" the thrombus through the right atrium to the infradiaphragmatic portion with the finger or gauze properly mounted. Then, clamping of the auricular tight IVC and cavotomy was performed. Or if the thrombus proves to be mobile and easily dissected, together with nephrectomy, after clipping the infrarenal IVC and contralateral renal vein, perform the suprarenal cavotomy concomitant with the act of "pushing" the thrombus anterogradely, leaving this way, kidney and thrombus in one piece, as described in the case (Cheng Peng, 2018). In cases where the tumor thrombus is found intracardiac, mortality reaches 50% intraoperatively (Andrea Benedetto Galosi, 2021).

CONCLUSION

As described in the case, we can conclude that the surgical technique adopted to approach the patient in question was within the existing standards in the literature, showing itself to be effective and possible when a harmonious and responsible multidisciplinary treatment is carried out.

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