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Case Report

Clinical case: renal tumor with succinate dehydrogenase deficiency during pregnancy

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ABSTRACT

Renal tumors during pregnancy present unique challenges due to the need to balance maternal and fetal health considerations. This case report describes a 31-year-old pregnant woman diagnosed with succinate dehydrogenase (SDH)-deficient renal cell carcinoma (RCC) during the second trimester. The patient presented with lumbar pain and hematuria, leading to the discovery of a left renal mass that was surgically removed via radical nephrectomy, with histopathological analysis confirming SDH-deficient RCC, stage 1. Postoperative care involved anticoagulation therapy, fetal heart rate monitoring and close follow-up. These tumors demand a multidisciplinary approach, with diagnostic tools like ultrasound and MRI to minimize fetal exposure to radiation. SDH-deficient renal tumors, a rare subtype of RCC, requires precise, that requires precise diagnosis due to their association with tumors such as paragangliomas and pheochromocytomas. Treatment strategies, including surgical intervention, are typically tailored to the tumor's characteristics, symptoms, the patient's wishes and the pregnancy stage, being the second trimester the safest period for surgery. Discussion highlights the importance of individualized care and a collaborative medical approach for optimal outcomes for mother and fetus. Managing renal tumors during pregnancy is complex, requiring careful consideration of maternal and fetal health. A multidisciplinary approach, timely surgical intervention, and individualized treatment plans are essential for optimizing outcomes. Second trimester is often the safest time for surgery, with more aggressive treatments deferred until after delivery, depending on tumor's characteristics and pregnancy stage. This case underscores importance of tailored strategies to ensure the best prognosis for mother and child.

Keywords: RCC, Pregnancy, SDH deficiency, Nephrectomy

INTRODUCTION

Renal tumors are abnormal growths of cells in the kidney that can be either benign or malignant (cancerous). Among the benign tumors are renal adenomas, oncocytomas, and angiomyolipomas. Renal adenomas are small and generally asymptomatic, but they are often discovered incidentally and can resemble renal cell carcinoma (RCC) on imaging studies, leading to their frequent removal to confirm the diagnosis. Oncocytomas, composed of oncocytic cells with granular cytoplasm, can also be difficult to distinguish from RCC. Angiomyolipomas, made up of blood vessels, smooth muscle, and fat, are associated with tuberous sclerosis and can cause symptoms if they grow large enough to rupture and bleed.[1-3]

Regarding malignant renal tumors, RCC is the most common type of kidney cancer in adults and is subdivided into several histological subtypes, with clear cell carcinoma, papillary carcinoma, and chromophobe carcinoma being the most common. Another type of malignant tumor is urothelial carcinoma, which originates in the urothelium, the lining of the urinary tract, and can affect the renal pelvis and ureter, often being associated with bladder carcinomas. Renal sarcoma, a rare malignant tumor originating in the connective tissues of the kidney,

tends to be aggressive and carries a poor prognosis. Lastly, a rare variant is RCC with SDH deficiency.[1,2]

Renal tumors during pregnancy are rare and present unique challenges, as both maternal and fetal health must be considered. The presence of a renal tumor during pregnancy can complicate clinical management and requires careful evaluation to determine the best therapeutic approach that minimizes risks to both. Specific considerations include avoiding surgery and invasive interventions in the first trimester due to the high risk of miscarriage, considering the second trimester as the safest period for surgery due to the lower incidence of fetal and maternal complications, and in the third trimester, surgical intervention may be postponed until after delivery if the tumor is asymptomatic and aggressive malignancy is not suspected.[4-6]

This case presents an RCC during the second trimester of pregnancy.

CASE REPORT

A 31-year-old female, a housewife, with no significant medical, surgical, traumatic, or allergic history, is presented. She has a gynecological-obstetric history of four pregnancies, with three deliveries and no abortions, and all three children are alive. She had menarche at 13 years and is currently 12.9 weeks pregnant. A relevant history includes preeclampsia at the end of her second pregnancy. Her prenatal care is up to date, and genetic testing was performed, with no other alterations or complications reported during this pregnancy. As for treatments, the patient uses paracetamol for fever or pain and takes iron and folic acid QD. She has received two doses of the COVID-19 vaccine. Combe negative.

Her current condition began three weeks prior when she experienced severe lumbar pain associated with apparent occasional vaginal bleeding, leading to her admission to the emergency department due to suspected threatened abortion. On physical examination, no signs of vaginal bleeding were observed, but erythrocytes were found in the urinalysis. A renal ultrasound was performed, revealing a normal right kidney and a left kidney with a 5.8×6×6.5 cm mass in the upper pole, solid with partially defined borders and heterogeneous echotexture. An MRI described an exophytic mass measuring 53×54×70 mm, extending from the renal pelvis and breaching the cortex in close contact with the spleen, without evidence of invasion, with areas of necrosis and a renal score of 9a, suggestive of RCC, also associated with hemorrhagic content in renal pelvis and proximal ureter (Figure 1).

The patient persisted with mild pain and intermittent anemizing gross hematuria with a drop in hemoglobin from 11.2 to 9.2 g/dl, leading to a decision to perform a left radical nephrectomy at 14.4 weeks of gestation. The procedure was performed via open approach with a lumbotomy incision without complications, with minimal blood loss, and with normal fetal heart rate before and after the procedure. The specimen was sent for histopathological evaluation, determining that the tumor was an SDH-deficient renal carcinoma, pT1b pN0 M0, stage 1, with clear margins, no evidence of lymphovascular infiltration, and no sarcomatoid or rhabdoid features. She was admitted to postoperative care, where she was assessed without signs of uterine activity, fluid leakage, or vaginal bleeding, and enoxaparin therapy was initiated and continued for four weeks with a satisfactory evolution. She was evaluated by the oncology department, which recommended genetic screening for relatives, ongoing oncological surveillance without adjuvant therapy, and repeating MRI in six months. She continues to be followed by urology, nephrology, and gynecology for high-risk pregnancy without complications or renal function abnormalities.

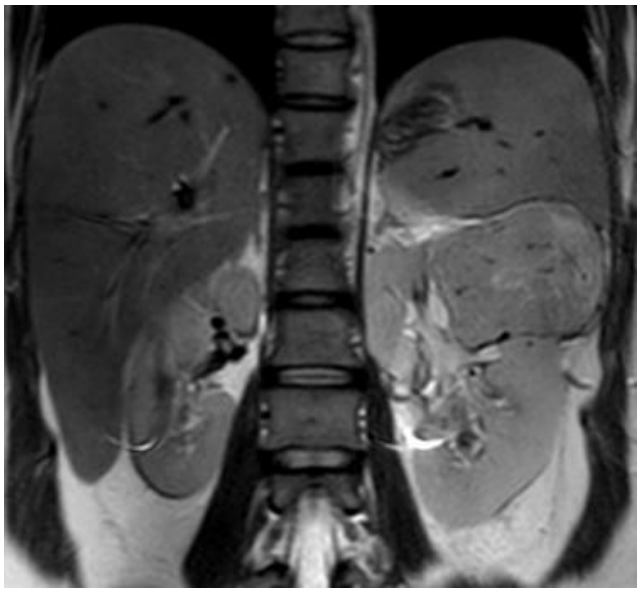

Figure 1: Coronal section of a nuclear magnetic resonance imaging scan, showing an exophytic mass in the upper pole of the left kidney.

DISCUSSION

The management and approach to renal tumors during pregnancy represent a significant challenge due to the need to balance the risks and benefits for both the mother and the fetus. Renal tumors during pregnancy are uncommon, but when they occur, they require a multidisciplinary approach involving specialists in urology, obstetrics, oncology, and radiology to ensure the best possible outcome. The diagnosis of renal tumors in pregnant women must be carefully planned to minimize radiation exposure that could affect the fetus. Among patients with renal cancer, pain was the most common symptom, affecting 28% of cases.[7] Preferred diagnostic tools include renal ultrasound, which is the first-line diagnostic method due to its safety and efficacy in detecting renal masses without exposing the fetus to ionizing radiation, and magnetic resonance imaging (MRI), which is the best

option for obtaining a detailed image of the tumor without the risks associated with radiation.[3,8] In the case of SDH-deficient renal tumors, the absence of staining for SDHB is a key indicator of SDH deficiency, helping to differentiate this subtype from other types of renal cancer (RCC) as well as identifying mutations in SDH genes (particularly SDHB) that are definitive for the diagnosis of SDH-deficient RCC. Genetic testing is essential to confirm the underlying cause of SDH deficiency.[9,10]

SDH-deficient renal tumors are a rare type of RCC characterized by mutation or loss of function in one of the subunits of the SDH enzyme complex, which includes SdhA, SdhB, SdhC, and SdhD. These tumors were recently recognized as a specific category within the classification of renal carcinomas.[10] Mutations in SdhB are not only linked to RCC but also to other tumors such as paragangliomas and pheochromocytomas, as well as gastrointestinal stromal tumors (GIST) in the patient and family members. These mutations lead to dysfunction in the SDH complex, which may contribute to tumorigenesis by altering cellular metabolism and increasing oxidative stress.[10] The prognosis is usually favorable if tumor is completely removed, and follow-up is essential.

The treatment of renal tumors during pregnancy should be individualized taking into account the tumor's size, location, disease stage, and the pregnancy stage, as well as the patient's wishes. Managing these tumors can be complex due to their rarity and potential aggressiveness. Treatment may include the surgical removal of the tumor, which is the primary approach if the tumor is localized and operable. In cases of advanced or metastatic disease, treatment options may include targeted therapies or clinical trials, as conventional approaches such as chemotherapy may be less effective. In most cases, systemic treatments are not usually an initial option. It has been reported that the use of medications such as ipilimumab (CTLA-4 inhibitor) and nivolumab (PD-1 inhibitor) may provoke an immune response against the fetus, as these immune checkpoint inhibitors are immunoglobulin G antibodies that can cross the placental barrier and potentially cause direct toxicity to the fetus.[11]

Surgical interventions are typically among the primary management tools since, if the tumor is large, symptomatic, and has characteristics suggestive of malignancy, as in the presented case, partial or radical nephrectomy is the standard treatment for localized malignant renal tumors. The decision to perform nephron-sparing surgery will be preferred in patients with chronic kidney disease, with a clinically stage I tumor and a lower rensal score. Nephrectomy can be performed openly, laparoscopically, or robot-assisted. Although it is already established that laparoscopy is safe during pregnancy due to its association with shorter surgical time and faster recovery, the retroperitoneal approach or open approach via lumbotomy could reduce the impact on abdominal pressure elevation and acid-base balance alterations due to CO_2 insufflation in centers where urologists trained in lumboscopy are unavailable. The second trimester is generally the safest time to perform surgery, as the risk of miscarriage and preterm delivery is lower. If the tumor is asymptomatic and not considered aggressive, and the patient is in the third trimester, definitive treatment may be delayed until after delivery, allowing for broader management without the risks associated with pregnancy.

Interventions should be planned to minimize the risk of preterm delivery, miscarriage, and exposure to teratogenic drugs or procedures. Treatment planning should involve a multidisciplinary team that includes urologists, obstetricians, oncologists, anesthesiologists, and neonatologists to ensure all aspects of maternal-fetal care are considered. The prognosis depends on the type and stage of the tumor. After treatment, follow-up should be rigorous to monitor for tumor recurrence and ensure pregnancy health, with imaging studies continuing, adjusted to avoid unnecessary risks to the fetus.

CONCLUSION

The management of renal tumors during pregnancy is complex and requires careful consideration of both maternal and fetal health. A multidisciplinary approach, timely surgical intervention, and individualized treatment plans are essential for optimizing outcomes. The second trimester is often the safest time for surgery, while more aggressive treatments may be deferred until after delivery, depending on the tumor's characteristics and the pregnancy stage. This case underscores the importance of tailored, patient-specific strategies in ensuring the best possible prognosis for both mother and child.

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