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Renal Cell Carcinoma During Pregnancy Diagnosed by Fine Needle Aspiration Cytology and Confirmed by Histopathology: A Rare Case Report

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Abstract: ***Renal cell carcinoma (RCC) during pregnancy is an exceptionally rare condition that presents both diagnostic and therapeutic challenges due to overlapping clinical features and the limitations of imaging modalities in pregnant patients. We report a rare case of RCC diagnosed during pregnancy by fine-needle aspiration cytology (FNAC) and subsequently confirmed by histopathology. Our patient was a 30-year-old woman with a renal mass and concurrent intrauterine pregnancy. Guided FNAC of the renal mass revealed tight clusters and papillary arrangements of atypical malignant cells with moderate eosinophilic cytoplasm, consistent with RCC. This case underscores the importance of multidisciplinary collaboration in the management of malignancies during pregnancy, with careful consideration of both maternal and fetal outcomes.***

Keywords: Fine needle aspiration cytology, Renal cell carcinoma, Histopathology, Image-guided biopsy, Pregnancy, Renal mass, Diagnosis

1. Introduction

Renal cell carcinoma (RCC) is among the 10th most common and lethal malignancies, accounting for approximately 2–3% of all adult cancers worldwide [1,2]. It typically presents in the fifth to seventh decade of life and has a higher incidence in men compared to women [3]. RCC in young adults is uncommon, and its occurrence during pregnancy is exceedingly rare, with only a limited number of cases reported in the literature [4–6]. The clinical diagnosis of RCC can be challenging due to its highly variable and often nonspecific presentation.

2. Case Report

A 30-year-old female presented with two-month history of swelling over the left side of the abdomen, which had been progressively increasing in size and was associated with pain. She had been pregnant for five months. There was no history of fever, hematuria, burning micturition, melena, hematemesis, weight loss, or loss of appetite. Family and personal histories were unremarkable. Abdominal examination revealed a diffuse tender, firm to hard mass in left lumber region. On USG Large heterogenous mass in left renal fossa in left lumbar region along with single live intrauterine fetus of 20weeks+3 days (± 2.1 weeks) was present. MRI Scan showed large heterogenous mass in left renal fossa with non-visualized left kidney separately with infiltration on spleen, and left psoas major and quadratus lumborum muscle with indentation of anterior abdominal wall consistent with malignant renal mass along with intrauterine pregnancy.

Under precaution and guidance FNAC was performed percutaneously from palpable left renal mass. Cytological examination showed cellular smear with malignant cells dispersed in clusters, papillae, and lying singly in hemorrhagic background. Tumor cells are round to oval, having high nucleocytoplasmic ratio, opened up chromatin and moderate amount of eosinophilic vacuolated cytoplasm. Fair number of arborizing blood vessels are also seen. Cytomorphology is suggestive of clear cell renal cell carcinoma. Further biopsy from renal mass was send for histopathological conformation and it was diagnosed as clear cell variant of renal cell carcinoma. USG guided renal biopsy was performed and showed that a malignant neoplasm disposed in nests and sheets with distinct nuclear membrane, uniform round to oval nuclei with clear cytoplasm. USG guided renal biopsy confirmed the diagnosis of FNAC.

3. Discussion

Renal cell carcinoma (RCC) during pregnancy is an uncommon clinical entity, with an estimated incidence of fewer than 0.005% of pregnancies [7]. Among urological malignancies, RCC is the most frequently encountered during gestation, but its nonspecific presentation often leads to diagnostic delay. The most common symptoms are a palpable abdominal mass, flank pain, and hematuria; however, the classical triad is seen in less than 20% of patients. [8] In pregnancy, the detection of a palpable mass is more frequent (up to 80–90%) compared with the general RCC population, likely due to routine abdominal examinations [9].

Imaging plays a pivotal role in diagnosis, and ultrasound is the preferred first-line modality because of its safety profile. MRI

without gadolinium can further characterize renal masses and assess local extension, while CT is generally avoided due to fetal radiation exposure. [10,11] In our patient, ultrasonography identified a renal mass, prompting cytologic evaluation.

Fine needle aspiration cytology (FNAC), though less commonly used for renal tumors in the past, has regained importance as a minimally invasive diagnostic tool. Recent studies demonstrate that image-guided renal mass biopsy achieves diagnostic accuracy exceeding 90%**,** with high sensitivity and specificity for differentiating malignant from benign lesions [12-14] RCC typically shows distinctive cytomorphological features, including clusters of clear cells with vacuolated cytoplasm, granular eosinophilic cells, or oncolytic patterns. Ancillary tests such as immunocytochemistry can aid in excluding metastatic clear-cell tumors from other sites. [15] In our case, FNAC provided a rapid and reliable diagnosis, later confirmed by USG guided biopsy proved the FNAC findings of renal cell carcinoma.

Management of RCC during pregnancy is influenced by gestational age, tumor stage, and maternal–fetal risks. Current consensus suggests nephrectomy should not be delayed if RCC is diagnosed in the first or second trimester, with the second trimester being considered the optimal time for surgical intervention due to reduced maternal and fetal risk. [16,17] In the third trimester, treatment decisions must balance maternal disease progression with risks of preterm delivery; in patients near term, delivery followed by nephrectomy is recommended. [18] Multidisciplinary management involving urologists, obstetricians, radiologists, and anesthesiologists is essential for optimal outcomes.

This case highlights the utility of FNAC as a safe and accurate diagnostic modality in pregnancy, allowing early recognition of RCC and guiding timely surgical management. Early diagnosis is crucial to improving maternal prognosis while minimizing risks to the fetus.

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5. Conclusion

Renal cell carcinoma during pregnancy is an exceedingly rare entity that poses diagnostic and therapeutic challenges due to overlapping clinical features and limitations of imaging modalities. This case emphasizes the role of ultrasound and MRI as safe imaging tools during gestation and highlights the diagnostic utility of FNAC, which provided a rapid and reliable preoperative diagnosis subsequently confirmed by histopathology. Optimal management requires individualized, multidisciplinary decision-making that carefully balances maternal health with fetal well-being.

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Conflict of interest- The authors declare no potential conflict of interest with respect to research, authorship or publication of this article.

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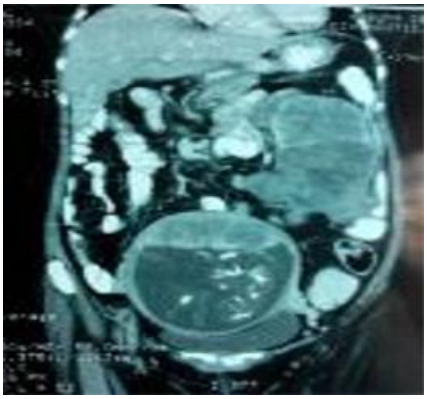

Figure 1: Radiology image

Figure 1- MRI showed a renal tumor with a live intrauterine pregnancy of 5month duration

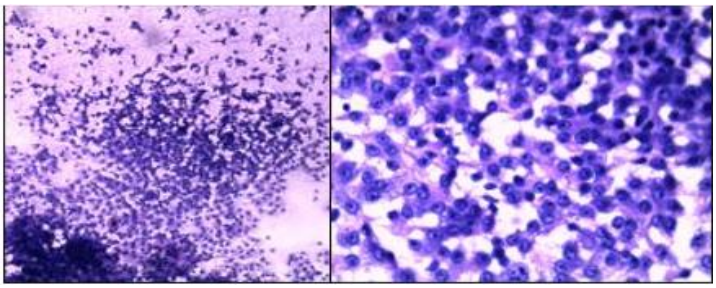

Figure 2: FNAC images

Figure 2: A (Low power) Malignant neoplasm disposed in sheets.

B (High power) Tumor cells with high N:C ratio, round nuclei, and, prominent nucleoli with clear cytoplasm

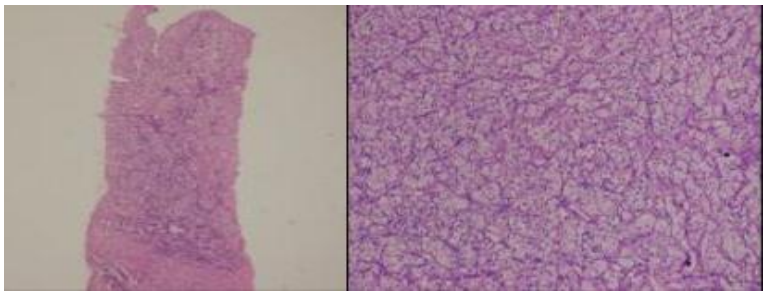

Figure 3: Biopsy images

Figure 3: A (Low power) Malignant neoplasm disposed in sheets.
B (High power) Tumor cells in compact nests with distinct membrane cytoplasm