



Case Report

Cytodiagnosis of renal cell carcinoma – A case report

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Abstract

Fine needle aspiration cytology (FNAC) under radiologic guidance for diagnosis of renal cell carcinoma is well established and is increasingly utilized. Guided FNAC is very helpful for diagnosis, grading and determining operability of renal tumors in adults. Ultrasonography (USG) guided percutaneous fine needle aspiration cytology of renal masses was first reported by Kristensen, et al. The exact diagnosis is possible due to the characteristic cellular features of renal cell carcinoma (RCC). Here, we presented a case of 45 years old female patient, who had retroperitoneal mass diagnosed as renal cell carcinoma on USG guided percutaneous fine needle aspiration cytology.

Key words

Ultrasonography, Fine needle aspiration cytology, Renal cell carcinoma.

Introduction

In 1930, Martin and Colley, and a technical developer, Ellis, conducted aspirations from several organs and carried out cytological studies on them [1]. Kristensen, et al. had first reported ultrasonography (USG) guided percutaneous fine needle aspiration cytology (FNAC) of renal masses [2]. FNAC under guidance is required for preoperative diagnosis if there is cystic change in solid renal masses or if the masses are suspected to be malignant. In adults, guided FNAC is very helpful for diagnosis, grading and determining operability of renal

tumors. The diagnosis of renal cell carcinoma by fine needle aspiration cytology does not cause diagnostic difficulties whether the aspirates are from the primary site or metastatic deposits [3]. This is because renal cell carcinoma shows rather characteristic cellular features allowing their correct cytologic identification [3]. Also in the present case, we had diagnosed the renal cell carcinoma from the cytology examination of the tumor cells. Here, we presented a case of 45 years old female patient, who had retroperitoneal mass diagnosed as renal cell carcinoma on FNAC.

Case report

A 45 years old female patient from lower socio-economic class presented with abdominal mass since 1 year in surgery outdoor patient department. On examination, patient had large right sided abdominal mass with tenderness in right lumbar region. The clinician advised ultrasonography (USG) which revealed mass in right side retroperitoneal region arise from the lower pole of right kidney measuring 18 X 10 cm. Patient's hematological and serological investigations were within normal limit. USG guided FNAC was advised and the mass to be aspirated was localised by USG. The site of puncture was marked on the skin and the area was cleaned with an antiseptic solution [4, 5]. A lumbar puncture needle attached to a 10 ml syringe was used for aspiration. The needle was inserted under guidance into the lesion. When it was clearly visualized within the mass, suction was applied and several passes were made within the lesion. The needle was withdrawn after release of suction and the site of puncture was sealed. The slides were grossly examined on the spot. The slides were neither heavily blood stained nor appeared to have scant material, so that the aspirate was not repeated. The material obtained was smeared on glass slides and immediately fixed in 95% alcohol and submitted to the cytopathology laboratory for routine processing [6]. The smear thus obtained was stained by hematoxylin and eosin (H and E) and Papanicolaou stains [7]. Diagnosis was made by microscopic examination of the stained slides which showed cellular smears with the cells arranged in loose clusters and scattered singly as well. The individual cells showed distinct cell borders and eosinophilic granular cytoplasm along with nuclear atypia. There was dense lymphocytic infiltrate in the background of hemorrhage. Overall features were that of renal cell carcinoma. (**Photo - 1, Photo - 2, Photo - 3**)

Photo – 1: Cellular smears with the tumor cells arranged in loose clusters and scattered singly as well. (H & E, 4X)

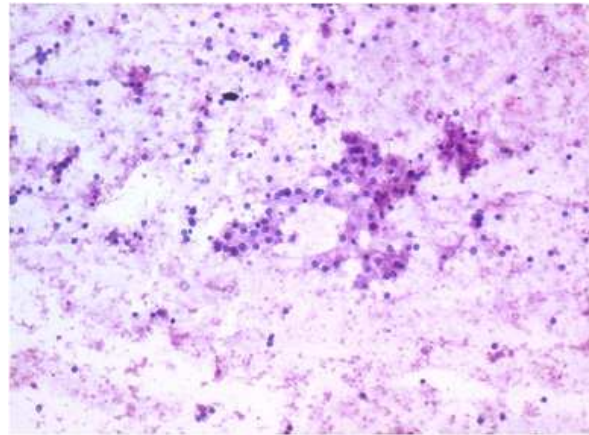


Photo - 2: Cellular smears with cluster of the tumor cells. (H & E, 10X)

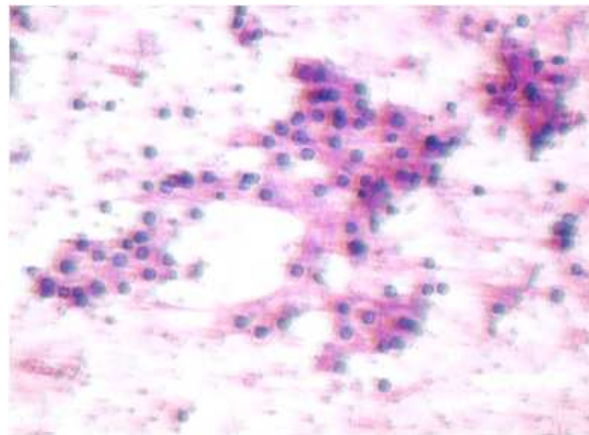
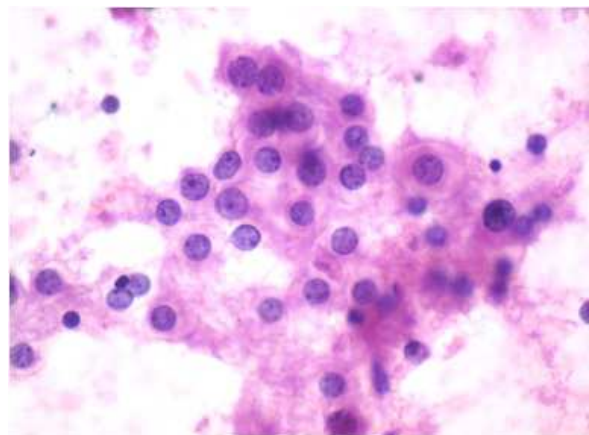


Photo – 3: Individual cells with distinct cell borders, eosinophilic granular cytoplasm and nuclear atypia. (H & E, 40X)





Discussion

The application of image guidance to aspiration cytology has brought about a revolution in the field of cytopathological diagnosis. Where initially only superficial and easily palpable lesions could be subjected to aspiration, now, even deep seated lesions can be visualized and aspiration can be performed with a high degree of accuracy and minimum discomfort to the patient. The need for exploratory surgery and its attendant morbidity is thus reduced significantly. Image guided fine needle aspiration (FNA) of retroperitoneal and pelvic masses are now an increasingly common diagnostic procedure.

Any structure visualized by dynamic ultrasonography (USG) can be reached quickly and precisely by a fine needle in any desired plane with constant visualization of needle tip during insertion [8]. As compared to its more illustrious counterpart, the computed tomography (CT) scan, USG has additional advantages in that it is comparatively inexpensive, can be easily repeated, and avoids the risk of radiation exposure [9].

Several studies had proven that fine needle aspiration cytology of a renal mass is a useful diagnostic procedure. With reference to malignancies, the usefulness of the method is related to its high sensitivity, 0.93, and high degree of typing accuracy [10, 11]. Reported success rates are 87-100% (mean of 93.5%) for renal tumors [10, 12].

Renal cell carcinoma is a relatively rare tumor accounting for less than three percent of all adult cancers [13, 14]. It is generally a tumor of adults where the average age at diagnosis is between 55-60 years [13, 14]. The clinical diagnosis of renal cell carcinoma is difficult since its clinical manifestations are quite variable.

Its usual presentations are hematuria (59%), flank pain (41%) and abdominal mass (45%). However, the combination of these three features, classically regarded as the diagnostic triad of renal cell carcinoma, occur in only nine percent of the patients and are usually a late manifestation [15]. Almost 25% of renal cell carcinoma is asymptomatic in which discovery of the tumor is incidental to routine physical examination and radiological study [16].

Although renal cell carcinomas can be diagnosed fairly accurately on cytology, difficulties can arise in the presence of massive hemorrhage or extensive necrosis [17]. This condition is particularly true for papillary variant of renal cell carcinoma because of the peculiar features of this variant that show presence of cystic and extensive degenerative changes [11].

Tumor cells may be single, or are arranged loosely in flat sheets, clusters, papillary fronds or an alveolar pattern. The smear pattern may occasionally be mixed. Three distinct cell types have been described on fine needle aspiration cytology [18], the clear cell, the granular cell and the oncocytic cell types, occurring either exclusively or admixed together. The clear cells of renal cell carcinoma have abundant, fragile, finely vacuolated cytoplasm, best appreciated on the Diff-Quik stain. The cytoplasm is highly characteristic [3]. In our case, the aspirates showed malignant cells with moderate amount of finely granular vacuolated cytoplasm and macronucleoli suggestive of renal cell carcinomas. These findings were corroborative with the findings from the study by Renshaw, et al. [19]. Granular cells have eosinophilic or cyanophilic cytoplasm, which is moderately dense and granular. Oncocytic cells have extremely dense, eosinophilic, compact cytoplasm with well-defined cell borders. Rarely, renal cell carcinoma may show a diffuse spindled appearance.



A nuclear grading system based on four nuclear grades defined in order of increasing nuclear size, irregularity and nucleolar prominence, proposed by Fuhman, et al. [20] showed that nuclear grade was effective in predicting survival and development of metastasis after nephrectomy [21]. This grading system has been popular in routine surgical material of renal cell carcinoma and could readily be applied to fine needle aspiration cytology material. Several studies using Fuhman's nuclear grading system showed high concordance between nuclear grading in fine needle aspiration material and histologic specimens (80-92%) [22].

The differential diagnosis includes primary adrenal cortical carcinoma which is very difficult to differentiate from renal cell carcinoma invading or metastasizing to the adrenal gland. But the study by Bennington JL and Beckwiht JB 1975, Weiss LM 1984 [13, 23] noted that adrenal cortical carcinoma tend to show more cellular anaplasia than do renal cell carcinomas. Electron microscopic study of tumour tissue may be helpful in making a correct diagnosis.

FNA under image guidance should be considered as first-line diagnostic approach for retroperitoneal and other abdominal tumors and lesions. However, a word of caution is essential. It is necessary to be selective in deciding which masses are to be aspirated. Further, in some cases, cytology cannot be relied upon to exclude malignancy, as in the case of renal cysts [24] and cysts of large size. Histopathology remains the gold standard in such cases. Therefore, the choice between pre-operative cytology and excisional biopsy lies with the surgeon. As in all cases, a thorough clinical workup is a pre-requisite and can help in reaching a good clinical decision.

Conclusion

With such applications, it is not unusual to occasionally diagnose unexpected lesions in which the combined radiological and cytological assessments enable the clinician to pursue a line of further investigation and make a correct management decision. Ultrasound guided fine needle aspiration is reliable, accurate, safe and well tolerated and it should be considered the initial investigation for renal mass.

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