

Original Research Article

Ultrasound evaluation of non-cystic renal masses and correlation with ultrasound guided fine needle aspiration cytology/biopsy

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ABSTRACT

Background: The purpose of present study was to identify sonologically, the cystic and non-cystic renal mass lesions, to attempt differentiating benign lesions from the malignant ones and to correlate ultrasound findings with ultra sonographically guided cytological or pathological findings.

Methods: In this hospital based prospective observational study, all the patients with confirmed renal mass were subjected to USG guided fine needle aspiration cytology (FNAC). All the patients presenting with lump in abdomen, haematuria or pain in abdomen, wherein the clinical diagnosis of renal mass was being considered by the clinician, were enrolled for the study. Total 54 participants were enrolled. Those with confirmed renal mass were subjected to USG guided FNAC and which was carried out in supine position by transabdominal route in all patients.

Results: About 42 participants were retained for final analysis; since FNAC was not possible in 12 patients. Pain in abdomen (36, 85.7%), mass in abdomen (34, 81%) were the most predominant clinical findings. Mixed echogenicity was the commonest echo pattern (42, 77.7%) on ultrasonography. Histopathologic/cytologic examination of the 39 malignant cases confirmed renal cell carcinoma (18, 46.5%) to be the commonest malignancy, followed by Wilms' tumour (10, 26%). Out of the 39 cases in which clinico-radiological diagnoses were correlated with histo-cytological diagnoses, it was found to be consistent in 30 (77%) cases and inconsistent in 9 (23.1%) cases.

Conclusions: Fine needle aspiration cytology/biopsy performed under ultrasonography guidance demonstrates high diagnostic accuracy. It is hence recommended as part of fundamental approach to the diagnosis of non-cystic renal mass.

Keywords: Fine needle aspiration cytology (FNAC), Non-cystic renal mass, Ultrasound abdomen

INTRODUCTION

The detection of renal masses is impossible by physical examination in most of the cases. Owing to various advantages like non-invasiveness, lack of ionizing radiation, wide availability, cost-effectivity, and the procedure being less time consuming, ultrasonography is generally the first line for patients with suspected renal masses.¹ The important contribution of ultrasonography is

its ability to create a multiple dynamic sectional image that enables better topographic orientation. In addition, the definition of delicate structures such as liver capsule, kidney capsule, its vessels, abdominal structures and vessels are useful in arriving at an accurate diagnosis.

Renal masses have got variable etiopathogenesis, such as malignant, benign, infective etc. Ultrasonography has high sensitivity and specificity to differentiate various

pathologies.² Also, ultrasound guided aspiration cytology like intervention procedures can be carried out for tissue diagnosis as an extension procedure. Blind aspiration technique always has had the inherent drawback of poor localization and therefore lower diagnostic accuracy especially in deep seated, small, impalpable lesions.³ USG aspiration cytology is an established diagnostic technique, with the number of FNACs per year going up consistently since it was instituted by Martin and Ellis in 1930.⁴

With the present study, authors set out to identify sonologically the cystic and non-cystic renal mass lesions, to attempt differentiating benign lesions from the malignant ones and to correlate ultrasound findings with ultra-sonographically guided cytological or pathological findings.

METHODS

It was a hospital based prospective observational study. The study was conducted at a tertiary care government teaching hospital over the period of two years (October 2008 to September 2010). All the patients referred to the radiodiagnosis department during the study period presenting with lump in abdomen, haematuria or pain in abdomen, wherein the clinical diagnosis of renal mass was being considered by the clinician, were enrolled for the study.

A pre-tested and validated proforma was filled up for each patient. Details of history, clinical examination and investigations were recorded as per proforma. Ultrasound examination was conducted by the principal investigator using real time ALOKA, ultrasonography machine with 3.5 MHz scanning probe, for guided FNAC. Site, size, echotexture and margins of the mass were assessed along with presence of calcifications or necrosis observed and recorded. Renal vein, inferior vena cava and surrounding lymph nodes were also examined for comprehensiveness. All the other relevant and significant findings were also duly noted, and a final radiological diagnosis was arrived at. Additional investigations like CT scan of abdomen, intravenous urography, X-ray chest, X-ray abdomen were also conducted wherever indicated. All the participants who were clinically and radiologically diagnosed as having solid renal mass were considered for the final analysis. In all, a total of 54 participants were thus considered at the initial level.

All the patients with confirmed renal mass were subjected to USG guided fine needle aspiration cytology (FNAC). Bleeding tendencies were looked for by checking bleeding time and clotting time before the procedure. USG guided FNAC was carried out in supine position by transabdominal route in all patients. The sample was sent to the Department of Pathology, where the tissue diagnosis was conducted by the co-investigator (who was blinded to the radiological finding and had access to the clinical notes provided with the requisition).

Statistical analysis was undertaken with a p value of <0.05 considered statistically significant. SPSS (Version 16) was used for data analysis.

Written informed consent was obtained from each participant at the time of enrollment. Approval from Institutional Ethics Committee was obtained before start of the study.

RESULTS

The present study comprised of 54 patients in whom solid renal mass was detected on ultrasonography and USG guided, FNAC was conducted for final tissue diagnosis. In 12 patients, fine needle aspirates were not obtained due to varying reasons, like unsatisfactory general condition for the procedure, widespread renal carcinoma cases with multiple enlarged para aortic lymph nodes and secondaries in liver and lungs, refusal to give consent etc. These 12 cases had to be excluded from the final analysis. So, a total of 42 participants were considered for final analysis.

Table 1: Clinical findings amongst study participants.

Clinical findings	No. of participants	%
Pain in abdomen	36	85.7
Mass in abdomen	34	81
Haematuria	14	33.3
Loss of weight and appetite	10	23.8
Fever	8	19
Burning micturition	5	11.9
Hypertension	3	7.1
Vomiting	2	4.8
Renal calculus	2	4.8
Secondaries in liver	2	4.8
Respiratory complaints	1	2.4

Table 2: Histopathologic/cytologic diagnoses of suspected malignant renal aspirates (n= 39).

Lesion	No. of cases	%
Renal cell carcinoma	18	46.2
Wilms' tumour	10	25.6
Transitional cell carcinoma	2	5.1
Squamous cell carcinoma	2	5.1
Metastatic lesion	2	5.1
Multilocular cystic nephroma	1	2.6
Lymphoma	1	2.6
Cellular leiomyoma	1	2.6
Adrenal papillary adenocarcinoma invading kidney	1	2.6
Malignant mesenchymal tumour	1	2.6
Total	39	100

Majority of the participants (12, 28.6%) were from the 0-10-year age group, with the rest being evenly distributed.

Male preponderance was observed amongst study participants (26:16). The most predominant clinical findings were pain in abdomen (36, 85.7%), mass in abdomen (34, 81%) and haematuria (14, 33.3%) (Table 1).

In the present study, amongst 54 patients enrolled initially, mixed echogenicity was the most common echo pattern (42, 77.7%) on ultrasonography, followed by hyper-echogenicity (8, 14.8%), hypo-echogenicity (3, 5.5%), with one patient (1.9%) having isoechoic echo-pattern.

A total of 42 patients were examined further sonologically of which 39 (92.8%) patients were suspected to be having malignant lesions, whereas it

appeared to be benign in remaining 3 (7.1%) cases on sonography.

Histopathologic/cytologic examination of the 39 malignant cases confirmed renal cell carcinoma (18, 46.5%) to be the commonest malignancy, followed by Wilms' tumour (10, 26%) (Table 2).

The clinic-radiological diagnoses were correlated with histo-cytological diagnoses amongst the 39 cases. It was found to be consistent in 30 (77%) cases, whereas it was inconsistent in 9 (23.1%) cases. All the cases of renal cell carcinoma (n=18), Wilms' tumour (n=10) and transitional cell carcinoma (n=2) were found to be consistently correlated, while no consistency was observed in case of other patients (Table 3).

Table 3: Correlation of ultrasound diagnoses with histo-cytologic diagnoses.

Lesion	No. of cases	No. of cases consistent with clinicoradiological diagnosis	No. of cases with inconsistent diagnoses
Renal cell carcinoma	18	18	0
Wilms' tumour	10	10	0
Transitional cell carcinoma	2	2	0
Squamous cell carcinoma	2	0	2
Metastatic lesion	2	0	2
Multilocular cystic nephroma	1	0	1
Lymphoma	1	0	1
Cellular leiomyoma	1	0	1
Adrenal papillary adenocarcinoma invading kidney	1	0	1
Malignant mesenchymal tumour	1	0	1
Total	39 (100%)	30 (77%)	9 (23.1%)

DISCUSSION

The present study was carried out to evaluate the ultrasonographic findings and the role of ultrasonography guided fine needle aspiration cytology (FNAC)/biopsy of the kidney. A total of 54 cases were enrolled initially, of which 42 were retained for final analysis, since FNAC was not possible in 12 patients.

The position of the patient during ultrasonography and guided FNAC is of importance and has often been discussed. Authors carried out the procedures in supine position in all patients. The theory is that liver, spleen and flank muscles are used as acoustic windows in this position, providing textural information superior to that obtained with the patient in prone position. Charboneau JW et al, examined 125 patients in supine (at times oblique) position in a similar study.⁵ Authors also had to use the oblique position occasionally for better visualization, but never prone. Holm had argued that right kidney is easily examined in supine position but left

kidney represented difficulty in scanning.⁶ Similar to our method, the transabdominal route was successfully used for aspiration by Krishnamurthy SC, also in his study at Tata Memorial Hospital, Mumbai.⁷ However, most of the researchers have documented employing prone position for the authors.^{8,9}

Authors studied non-cystic renal masses sonologically and encountered predominantly mixed echogenic pattern (42, 77.7%), which was due to calcifications, hemorrhage or necrotic/cystic areas in the lesions. This is in line with the findings of Charboneau JW et al, and Bosniak MA, among others.^{5,10}

Malignant lesions formed the largest group and included renal cell carcinoma, Wilms' tumour amongst others. The distribution of lesions encountered in this study, were comparable to the earlier similar studies.^{7,10-13} The most common presenting symptoms were pain in abdomen, mass in abdomen and hematuria, but the classic triad of renal cell carcinoma (all 3 together) was observed in only

15 patients. This is in line with the often-cited observations of Cohen HT et al.¹¹ The most common symptom in Wilms' tumour cases was mass in abdomen, observations concurring with those of Quijano G et al, Dey PR et al, and Civardi G et al.¹²⁻¹⁴

Of the 42 cases evaluated and included in the study, correlation was available in 39 cases. Of these 39 cases, 30 (77%) were found to have good correlation between histopathological/ cytological and sonological diagnoses. The findings were found inconsistent in 9 cases. This high correlation was similar to that reported by previous researchers in previous similar studies.^{5,7,11-14} There were no major complications encountered during procedures.

CONCLUSION

In conclusion, fine needle aspiration cytology/biopsy performed under ultrasonography guidance demonstrates high diagnostic accuracy. The positive yield or adequate specimen thus procured was as high as 97.5%. With the added comfort of knowing that the procedure involves minimal complications under sonological guidance, it is being recommended as part of fundamental approach to the diagnosis of non-cystic renal mass.

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