Original Article

PREDICTVE VALUE OF COMPUTED TOMOGRAPHY IN DIAGNOSING STAGE OF RENAL TUMORS

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Objective: To determine the frequency of true positive cases in staging of renal cell carcinoma on computed tomography(CT) tacking histopathology as gold standard.
Methods: 75 patients diagnosed as RCC on CT underwent nepherectomies and histopathological / radiological staging were compared.
Results: The overall sensitity of CT for diagnosing RCC was 93.33%. For T1a 100%, for T1b 51.7%, for T2 80%, for T3a 75%, for T3b 2% and for T4 100%. The sensitivity for N1 and N2 is 66.67% and 80.2% respectively. CT showed higher stage in 43.3% cases.
Conclusion: Computed tomography is still a good diagnostic modality for pre-operative staging of RCC and planning of surgery.
Keywords: renal cell carcinoma, computed tomography, ultra-sonography.

Introduction

Renal mass is an alarming situation for any urologist. Renal masses may include a variety of lesions. Renal cell carcinoma is the most common.[1] The less common lesions are angiomyolipoma, lymphoma, lipoma, leiomyosarcoma and metastatic tumors.[2] Renal masses may be cystic or solid. It is very difficult to distinguish between a complicated benign renal cyst and cystic tumor.[3,4] Out of all malignancies in adult it accounts for 2%. About 15% RCC are cystic as a result of hemorrhage or tumor necrosis. Cystic renal cell carcinoma, which is usually diagnosed at an early stage, has a slower growth rate and better prognosis than conventional.[5,6]

The tumor arises from the proximal renal tubular epithelium, forms a bulge on the cortex and tends to grow to outer surface at the poles of the kidney. Due to this it can be easily picked up by various imaging methods.[7] It has wide variety of symptoms. The classical triad, hematuria costovertebral pain and an abdominal mass is reported in 10-15% of the cases.[8]

Today more and more patients with renal cell carcinoma are being detected incidentally at an early stage because of the advancing imaging techniques.[9]

Ultrasonography (US) is noninvasive readily available and economical, can detect the size, site and extent of renal tumors. Ultrasound cannot detect masses less than 2 cm.[10] Echogenicity of the RCC is variable and isoechoic renal tumors are difficult to detect with ultrasound. This method is however operator dependent.

Computed tomography (CT) has a reported overall accuracy of 72-90%. It images renal masses but very small lesions may be missed, can distinguish 47% masses <5mm and 75% of those 10-15 mm in diameter. CT accurately differentiates intra-renal with extra renal extension in 82-90% of the cases. Computed tomography or MRI studies can assess perirenal masses and local spread.[11]

Methods

The project was completed at the department of urology, Services Hospital Lahore from feburary 2,2010 to February 5,2011. 75 patients, 41-90 years of age of both genders presenting in our setting confirmed as having unilateral renal cell carcinoma on CT and normal renal functions were included. A detailed history, physical examination, routine investigations, ultra-sonography and CT with contrast findings were recorded. The surgery was planned after anesthetist evaluation.

In our study, the kidney was approached by the transcostal flank incision. The peritoneum reflected anteriorly. Renal pedicle accessed without opening the Gerota's fascia. All renal arteries were ligated in continuity with silk 2/0 then renal vein was also ligated with the same suture. The ureter was ligated with vicryl 2/0. The renal vein and inferior vena cava examined for tumor thrombus extension. Thrombus removed where-ever possible. The kidney along with Gerota's fascia, and proximal ½ part of ureter was excised. Para-aortic lymph nodes when found enlarged was biopsied and sent for histopathology. Haemostasis secured, drain placed in the retroperitoneal space and muscles stitched in two layers with vicryl no.1 continuous suture. Skin stitched with prolene 3/0 interrupted sutures. Specimens were examined;

Sections were made. All specimens were sent for histopathology. The histopathologic findings regarding local, nodal and vascular involvement were compared with those in the imaging method (CT). The data collected was entered and recoded using SPSS 16.0. Two types of variables were defined vis-à-vis. Quantitative and Qualitative. The data recoded under these variables was used for further analysis. Mann-Whitney U test was used to compare the qualitative variables defined under CT and Histopathology in RCC patients. The test was performed at 5% level of significance.

Results

The patient's age ranged from 41 to 90 years. Mean age was 58.61 sd +11.376 years. Fifty seven patients (76.0%) were male and eighteen (24.0%) were females. 37 patients (49.33%) presented with haematuria/ lumber pain, 18 pts (24.0%) with palpable mass, 15 (20.0%) with PUO and classical triad was present in only 03 patients (4%) while h/o weight loss/anemia was present in 10 patients **(Fig.-1).**
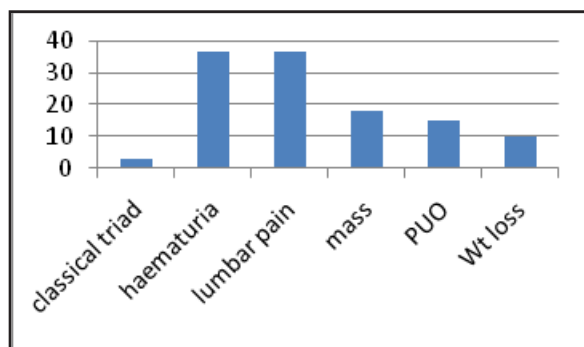

Fig.-1: Symptomatic presentation.

On histopathology 68 tumors were clear cell variant 5 were sarcomatiod and 2 specimens had no tumor and histology report showed xantho-granulomatous Pyelonephritis. Out of seventy five cases fifty nine had the same stage on histopathology and computed tomography. While in two cases the histopathological findings did not correlate with computed tomography . The histopathology proved those cases as xantho-granulomatous Pyelonephritis. All comparisons were made by using two by two frequency tables. In this study the overall sensitivity of computed tomography for T stage was 93.33%. As already stated histological staging was used as standard. The sensitivity and specificity of CT in various stages is described in **Table-1.**

Histopathology showed that two patients had stage T1a, same as were diagnosed on computed tomography .The sensitivity and specifity of this stage is 100%. For stage T1b, out of 15 cases computed tomography accurately detected 15 cases as proved on histopathology, scan gave high T stage. The sensitivity of CT for this stage is 51.720%. Histopathologicaly, twenty four cases were found T2 whereas CT diagnosed 30 cases. In the rest of the six subjects CT gave high T stage (histological stage was T1b). The sensitivity and specifcity of CT in this stage was 80% and 88.23% respectively. Computed tomography detected eight cases as T3a. Histopathology showed only six cases where as two cases were found T1b stage with the sensitivity of 75 %. Ten cases were picked up as T3b on computed tomography but only 2 were T3b histopathologically. CT accurately picked up only two cases. In six subjects histopathology staged as T1b and rest two cases were pyelonephritic kidneys. The sensitivity of CT in this stage was 20%. The computed tomography again showed high T stage in the rest of the six cases. And in two patients involvement of inferior vena cava and renal vein but actually it was big lymph node which was extirpated and histopathology proved it to be positive for tumor. CT detected ten cases as T4, duly confirmed histopathologically. The sensitivity of CT in this stage was 100%. Regarding Lymph Node involvement 11 patients were positive histopathologicaly in which 4patients N1 and 7patients were N2 while CT detected only 12 patients, in which 6 pts each in N1, N2 stage. CT under stage N2 and over stage N1 with the sensitivity of 85.71%,66% and specificity of 100%,97.18% respectively **(Tables 2).**

Table-1: Stage-wise Sensitivity of computer tomography.

Staging	CT (n)	Histology (n)	Sensitivity %	Spesificity %
T1a	2	2	100	100
T1b	15	29	1.72	100
T2	30	24	80	88.23
T3a	08	06	75	97.10
T3b	10	02	20	89.04
T4	10	10	100	100
Total	74			

Table-2: Stage-wise Sensitivity of lymphnodes on CT.

Staging	CT (n)	Histology (n)	Sensitivity %	Spesificity %
N0	63	64	96.87	90.9
N1	06	04	66.67	97.18
N2	06	07	85.71	100
Total	75	75		

Discussion

The staging of renal tumors helps in planning treatment and prognosis of the disease. The best predictor of prognosis for RCC is tumor stage[12]. The diagnosis of renal mass is mainly radiological. The tumor arises from proximal tubular epithelial cells in 85% of the cases. It forms a bulge on the cortex and tends to grow on outer surface of kidney towards the poles. Due to this character, it is easily picked up by various imaging techniques[13]. In the present study, histopathological staging was considered standard and compared with CT staging. Out of 75, 73 patients were confirmed to have RCC per-operatively and histo-pathologically. Two patients had xantho-granulomatous pyelonephritis, refuting the diagnosis on CT. the staging was done according to TNM system. Helical CT is considered to accurately diagnose 97.4% and stage 92.4% of RCC.[14] The appreciation of lymph nodes associated with RCC by CT was satisfactory. There were false positive and false negative results concerning lymph node involvement. In all 12 mentioned cases, histopathologist picked up lymph nodes in 11 cases, whereas CT gave false negative results as far as lymh node involvement was concerned. In 2 cases, CT mentioned involvement of renal vein but on histology there was no vascular invasion rather they were lymph nodes. CT remains the reference standard for staging renal tumors. The scan can take 1 cm slices so the small lesions are not missed[15]. Staging of T1 tumors is essential because infiltration in the perinephric fat is a contraindication to elective nephron-sparing surgery.[16] Huang et al showed that only 18% of patients with tumor measuring 4cm or smaller were treated with partial nephrectomy and percentage is increasing each year up to 26%.[17] Regarding lymph node assessment in this study computed tomography detected precisely N**1** in four patients. It gave false positive result in two patients with sensitivity of 66.67% and specificity 97.18%. Concerning stage N2 computed tomography accurately diagnosed six cases. 1 case was false negative. So the sensitivity of detecting lymph node in N2 stage was 87.71%.

In one international study,74% of patients with lymph node involvement were correctly staged,19% were over staged and 7% were understaged.[3] In spiral CT scan, identification of lymph node involvement using a thresh hold of 1cm as upper limit. A cut of value 1cm reveals a false negative finding of 10% because micro-matastasis cannot be identified, false positive findings vary between 3% and 43% in different study.[18]

Conclusions

Computed tomography is still a good diagnostic modality for pre-operative staging of RCC and planning of surgery.We conclude that the excess terminal hair growth is more common in overweight women having less hirsutism score.

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