ROLE OF ULTRASONOGRAPHY, COMPUTED TOMOGRAPHY ESTIMATING ABDOMINAL INVASION AND METASTASIS IN RENAL CELL CARCINOMA

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ABSTRACT

Objective: *Describe the ultrasonography and computed tomography features of renal cell carcinoma (RCC) and investigate the role of ultrasonography, computed tomography in estimating RCC invasion and metastasis in abdomen.*

Method: *Including 32 RCC diagnosed patients who underwent surgical treatment at Hue Central Hospital and Hue University of Medicine and Pharmacy from February 2013 to August 2014.*

Results: The ultrasonographic features*: The average size of tumor was 6.22 ± 2.41 cm; One case wasn't found by ultrasound.*

The computed tomographic features*: the size of tumors within 7 to 10cm occupied the highest rate at 40,62 percent (40.62%). Postoperatively, according to the pathological results, the tumor in T1 stage occupied the highest rate at 43.75 percent (43.75%). Compared the result of ultrasonography and computed tomography in finding calcification, vein thrombosis, located invasion and abdominal metastasis had $p < 0.05$ meant significant statistic.*

Conclusion: *Ultrasonograph is a useful method to detect early tumor. Besides, computed tomography, especially spiral computed tomography with the multi planar reconstruction ability, indicated many advantages in estimation located invasion and vicinage organs metastasis in abdomen. That is also the most important criterion to classify the stage of kidney cancer in order to determine the best treatment plan for patients.*

Key words: *Ultrasonograph, computed tomography, renal cell carcinoma (RCC)*

I. INTRODUCTION

Kidney cancer is a primary malignant cancer of the renal parenchyma, grows relatively fast, can develop in any location of the kidney. Kidney cancer accounts for approximately 3% of all cancers in adults and can occur in any age, in which renal cell carcinoma represents over 90% of malignant tumors in the kidney [4], [8]. Clinical symptoms of kidney cancer are often not clear, at present over 40% of patients with incidentally discovered consult with renal tumors. Thus, the role of diagnostic imaging, including ultrasound and computerized tomography are two means to early detect, diagnose, accurately kidney cancer

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stage and helps to treat kidney cancer most effectively [4], [6]. Therefore, we conducted this topic with the goal of:

Describing the ultrasonography and computed tomography features of renal cell carcinoma (RCC) and investigate the role of ultrasonography, computed tomography in estimating RCC invasion and metastasis in abdomen.

II. SUBJECTS AND RESEARCH METHODS

2.1 Research subjects

Including 32 patients who were diagnosed renal cell carcinoma, surgical treated at Hue Central Hospital and University Hospital of Medicine and Pharmacy from 2/2013 to 8/2014

2.1.1. Patient selection criteria:

Patients had ultrasound imaging and computed tomography images suspected kidney cancer, indicated pathological operation and identified diagnosis RCC.

2.1.2. Exclusion criteria:

Patients with RCC underwent chemotherapy, radiation or surgical procedure.

2.2. Research methodology:

Cross-sectional descriptive. Convenient sample size.

2.3. Content Research

- Ultrasound: noted the features of the tumor, size, deformity and hypervascular characters of tumor.

- Computed tomography: identified features and invasion of tumor.

- (World Health Organization 1997) T, N, M Staging by WHO 1997

- Compare ultrasound, computed tomography images in assessment of invasion and abdominal metastasis of RCC with the pathological results.

2.4. Data analysis

Data processing computer program SPSS 16.0.

III. RESEARCH RESULTS

3.1. Features of ultrasound images

Table 1: Distribution of RCC location under ultrasound

Tumor location	On the right	On the left	n	%
Superior pole of kidney	4	4	8	25.00
Medial area of kidney	5	1	6	18.75
Inferior pole of kidney	6	7	13	40.63
Whole kidney	2	2	4	12.50
Not detected			1	3.12
Total	**17**	**14**	**32**	**100**

Table 2: Dimensions of kidney tumors under ultrasound

Tumor size (cm)	n	%	
< 4	8	25.00	Average tumor size: 6.22±2.41 cm
4 – 7	9	28.12	
7-10	13	40.62	
>10	1	3.13	
Not detected	1	3.13	
Total	**32**	**100**	

Table 3: The sound quality on ultrasound kidney tumor

Acoustic properties	n	%
Hyperechogenic	12	37.50
Isoechogenic	3	9.38
Isoechogenic + calcified	1	3.12
Hypoechogenic	5	15.62
Hypoechogenic + calcified	1	3.12
Heterogenous	7	21.88
Heterogenous+ calcified	2	6.25
Not detected	1	3.12
Total	**32**	**100**

Table 4: The other image features of renal tumors on ultrasound

Features images	n	%
More hypervascular	20	62.50
Less hypervascular	8	25.00
No hypervascular	3	9.38
Lesion		
- Invade calyces, renal pelvis	5	15.63
- Invade perinephric fat	7	21.87
Thrombosis		
- Left renal venous throm bosis	1	3.12
- Rightrenal venous and vena cava	1	3.12
Renal hilus lymphoid nodule	2	6.25
Lymphoid nodule around major blood vessels	2	6.25
Both regional lymphoid nodule	1	3.12
Liver metastases	2	6.25

3.2. Features in computed tomography images

Table 5: Kidney tumor images on CT before injecting contrast media

Density	n	%
Hyperdense	14	43.75
Hypodense	3	9.37
Isodense	2	6.25
Heterogenous density	13	40.63
Calcification	7	21.87
Necrosis	22	68.75

Table 6: kidney tumors Images on CT after injection of contrast

Photos	n	%
Contrast enhanced: Strong	29	90.62
Less	2	6.25
No	1	3.13
Lesion	2	6.25
- Invade calyces, renal pelvis	7	21.88
- Invade perinephric fat	1	3.12
Thrombosis	1	3.12
- Left renal venous	1	3.12
- Rightrenal venous and vena cava	2	6.25
Renal hilus lymphoid nodule	1	3.12
Lymphoid nodule around major blood vessels	2	6.25
Both regional lymphoid nodule	2	6.25
Liver metastases	3	9.37
Peritoneal Metastases	1	3.12

Table 7: Evaluation of kidney tumors according to the TNM (WHO 1997)

Classification	n	%
T1	14	43.75
T2	6	18.75
T3a	8	25.00
T3b	4	12.50
N0	27	84.37
N1	3	9.38
N2	2	6.25
M0	28	87.5
M1	4	12.5

3.3. Comparison the results of ultrasound and computerized tomography

Table 8: Comparison of venous thrombosis detected by ultrasound with CT

CT / US	have		Not have		Total
	n	%	n	%	
Have	2	6.25	0	0	**2**
Not have	2	6.25	28	87.5	**30**
Total	**4**		**28**		**32**
Kappa = 0.636, p = 0.012					

Table 9: Comparison of metastases detected by ultrasound with CT

CT / US	have		Not have		Total
	n	%	n	%	
Have	2	6.25	0	0.0	**2**
Not have	2	6.25	28	87.5	**30**
Total	**4**		**28**		**32**
Kappa = 0.636, p = 0.012					

Table 10: Comparison of tumor stage on CT with postoperative pathogenic results

Path / CT	T1		T2		T3a		T3b		Total
	n	%	n	%	n	%	n	%	
T1	14	43.75	0	0	0	0	0	0	14
T2	0	0	6	18.75	0	0	0	0	6
T3a	1	3.12	2	6.25	5	15.63	0	0	8
T3b	0	0	0	0	0	0	4	12.50	4
Total	15		8		5		4		32
Kappa = 0.865, p = 0.00									

IV. DISCUSSION

4.1. Regarding the value of ultrasound in diagnosing RCC

In our study, RCC equally distributed on both sides of the kidney with the ratio of right / left was 17/14 (1.21/1), the average size of the tumors was 6.22 ± 2.41 cm, hyperechoic tumor with the highest percentage of 37.5%, hypervascular tumor also prevailed at the rate of 62.5%. Our study were similar to those of Tabibi Ali et al (2007), by Nguyen The Truong (2005), Nguyen Minh Duc (2011) [1], [3], [5].

In this study, there was one case which undetected tumor on ultrasound, because ultrasound is limited to accurately diagnose RCC < 2 cm, at the upper pole of kidneys or in fat patients [2].

Throughout the research progressed, we recognized that most of the solid tumors were hyperechogenic or heteroechogenic; Most of the heteroechogenicor hypoechoic mass were large in size, the hypoechogenic areas corresponded to necrosis; signs of calcification were low rate but significantly valuable in pointing malignancy [2], [5]. Ultrasound also detected two patients in the study group had renal vein thrombosis, as a result of diagnostic computerized tomography [7]. Ultrasound detected and diagnosed of inferior vena cava tumorous thrombosis at behind liver positions easily, the inferior position was not because inferior vena cava this place is deep in the retroperitoneal cavity, especially in abdominal distending or fat patients [2]. Assessment of invasion or metastasis around the tumor by ultrasound met with limitation result from narrow field of view cause difficulties to determine the exact anatomy and metastatic lesions smaller than 2 cm, iso or hypoechoic tumors were very difficult to detect [8].

4.2. The value of computed tomography in diagnosis

Through our research, the size and location of kidney tumor on computed tomography are similar to the results of the ultrasound, the hyperdense tumor possessed high percentage at 43.75%, strong enhanced tumors were also major and similar to the studies of Ali et al Tabibi, Nguyen The Truong, Nguyen Minh Duc [1], [3], [5].

Non-enhance CT images were difficult to identify the degree of invasion outside the capsule and surrounding tissues. Contrast enhance CT Images showed fast, heterogenous enhancement, infiltrating fat around the kidney clearer and commonly found in tumor size [6].

According to the research of Chaan et al, the sign of invasion in surrounding fat, adrenal was essential to distinguished stage I, II to stage III, our study had lower rate than other studies due to

the small quantities of our patients, not sufficiently statistic and limit faculty additionally[6]. However, computerized tomography detected calcifications better than other means and invasion more accurate than ultrasound [7].

In our study the majority of patients were in stage T1, T2 with 20 cases (62.5%) and stage T3 with 12 cases (37.5%), 4 cases of abdominal metastasis. Some studies of foreign authors showed that most patients had surgery in stage T1 and T2 [5], [6].

4.3. Comparison ultrasound and computerized tomography

CT correctly appreciated 14/15 cases with T1, the accuracy rate was 93%. In this study, only 1 case of T1 and 2 cases of T2 stage were overestimated at the T3a stage, this can be due to earlier Inflammation of hemorrhagic and necrosis of fat around the kidney. We concluded that invasive assessment of adipose tissue around the kidney remains a difficult problem even with single detector and multi-detector CT [6].

CT also evaluated very well the location and condition of renal vein and inferior vena cava thrombosis with an accuracy rate of 100% [7].

V. CONCLUSION

By studying ultrasound images and computerized tomography of 32 RCC patients we drew some of the following characteristics: inferior pole position tumors were high percentage on both ultrasound and computerized tomography. The majority of tumors were hypervascular, calcification in the tumor was detected more accurately on computerized tomography (21.87%). Computerized tomography demonstrated more superiority in invasive evaluation and abdominal metastases. T1 and T2 stages embraced the highest percentage of 62.5%, N0 (84.37%). There is a tightly suitable between reconciliation staging of RCC on computerized tomography compared with postoperative pathological results.

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