DIAGNOSTIC ACCURACY OF ULTRASOUND IN URINARY BLADDER CARCINOMA KEEPING HISTOPATHOLOGY AS GOLD STANDARD

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ABSTRACT

Introduction: Primary carcinoma of the urinary bladder is aggressive malignancy that affects men more frequently than women. Despite advances in cross-sectional imaging, early-stage tumors are not often encountered. Ultrasound is widely used for diagnosis of urinary bladder carcinoma. However in obese patients ultrasound has limited role due to patient body habitus and degradation of image quality and anatomic details.

Objective: To determine the diagnostic accuracy of ultrasound in urinary bladder carcinoma keeping histopathology as glod standard.

Material And Methods: This cross sectional vlidational study was conducted at the Radiology Department of Post-graduate Medical Institute, Hayatabad Medical Complex, Peshawar over 207 patients from 1st June 2011 to 31st December 2011.

Results: In this study, 207 patients with suspected urinary bladder carcinoma had observed through ultrasound and underwent biopsy for confirmation. Male to female ratio was 3.05:1. Average age was 54.75 years$\pm$ 13.28SD with rang of 22-86 years. Over all the diagnostic accuracy of ultrasound in diagnosis of urinary bladder carcinoma is 86.96%.

Conclusion: Ultrasonography (US), which is readily available, noninvasive, and cost-effective, is the imaging modality of choice for UB carcinoma.

Key Words: Hematuria, urinary bladder carcinoma, ultrasonography.

INTRODUCTION

Bladder cancer is a worldwide problem, at any point in time 2.7 million people have a history of urinary bladder carcinoma[1]. Cancer of the bladder is estimated to be the 9th most common cause of cancer worldwide and 13th most numerous cause of death from cancer[2]. Incidence rates are high in many southern and eastern European countries, in parts of the Africa and Middle East and North America and the bladder cancer is the most common urinary cancer in china.[3]

Bladder carcinoma is the most common urologic malignancy in Pakistan.[4] The peak incidence is 5th-7th decade of life. Bladder tumor is higher among low socioeconomic group.[5,6] Morphologically the most frequent type of tumor is polypoid, followed by sessile and diffuse wall thickening.[7] Risk factors for bladder cancer are smoking, carcinogens in work place like aromatic amines and in third world country Schistosomiasis.[7] Most bladder cancers are transitional cell carcinoma. Other types include squamous cell carcinoma and adenocarcinoma.

In patients presenting with hematuria or non specific urinary symptoms like dysuria, frequency or urgency ultrasound is useful imaging modality as it shows reasonable sensitivity and specificity in identifying causes of hematuria. It is cheap, easily available, non invasive and negligible discomfort. It can be useful in determining the size of the bladder cancer and whether it has spread beyond the bladder. It helps in clarifying pathologies in the upper renal tract i.e, ureteric obstruction secondary to bladder carcinoma and provide images of both upper and lower renal tracts.[8]

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MATERIAL AND METHODS

This cross sectional validational study was done 207 patients in department of Radiology, HMC Peshawar from1st June 2011 to 1st January 2012 after approval of intuitional Ethics and Research Committee was taken.

All the inpatients, outpatients and patients referred from casualty to Radiology Department were followed. Explanation was given regarding the nature of procedure and written consents were obtained. Standard protocol for urinary bladder (grey scale and color/power Doppler transabdominal and suprapubic ultrasound) was adapted. All the ultrasounds were done by same expert. Nemio-20 ultrasound machine with color/power Doppler and 7.5 MHz linear and 3.5 MHz curvilinear available in Hayatabad Medical Complex, Peshawar was used. Observations were properly recorded. After ultrasound all patients were referred for histopathology and all the biopsies were performed by

same expert histopathhologist. I myself followed up all the biopsies. All informations including name, age, sex address, ultrasound report and histopathology report were recorded on the attached proforma.

Already diagnosed cases of urinary bladder carcinoma, Patients with history of trauma and bleeding disorders were excluded to avoid confounders and biases. The data was analyzed using statistical package SPSS version 17.

RESULTS

In this study, 207 patients with suspected urinary bladder carcinoma had observed through ultrasound and underwent biopsy for confirmation. Male were found n=156(75.36%) of the patients, while n=51(24.64%) were female patients. Male to female ratio was 3.05:1

Patients age was divided in four categories out of which most presented in old age i.e n=100 in 51-70 years which was 48.3% while n= 6 (2.9%) patients were of age less than or equal to 30 years, n= 78 (37.7%) patients were of age range 31-50 years and n= 23 (11.1%) presented at age more than 70 years. The study included age ranged from 22 up to 86 years. Average age was 54.75 years $\pm$ 13.28SD. Majority of cases n=155 (74.88%) were diagnosed as urinary bladder carcinoma by biopsy and while the remaining n=52 (25.12%) cases turned out to be negative for urinary bladder carcinoma on biopsy.

Age wise distribution of biopsy results shows that majority of the urinary bladder carcinomas n= 78(50.3%) were in 51-70 years of age, n=2 (1.3%) patients have age less than or equal to 30 years, n= 55(35.5%) have age range of 31-50 years and n=20 (12.9%) cases have age range of more than 70 years. Similarly n=4 (7.7%) patients have age less than or equal to 30 years, n=23 (44.2%) have age 31-50 years, n= 22 (43.3%) patients have age 51-70 years and n=3 (5.8%) patients were found to be of age more than 70 years.

Table 1: Accuracy of Ultrasound in Diagnosis of Urinary Bladder Carcinoma

		Biopsy Findings		Total
		Positive	Negative	
Ultra-sound Findings	Positive	148	20	168
	Negative	7	32	39
		155	52	207

Parameter	Estimate
Sensitivity	95.48%
Specificity	61.54%
Positive Predictive Value	88.1%
Negative Predictive Value	82.05%
Diagnostic Accuracy	86.96%

Appearance of carcinoma urinary bladder on ultrasound among 148 patients was analyzed as n=121(81.7%) patients had polypoidal growth in urinary bladder, n=19 (12.8%) had sessile bladder growth where as n=5(5.4%) had diffuse wall thickening. Ultrasound of urinary bladder play a key role in diagnosis of urinary bladder carcinoma. Over all the diagnostic accuracy of ultrasound in diagnosis of urinary bladder carcinoma is 86.96%. (Table No. 1)

DISCUSSION

Hematuria poses diagnostic and therapeutic challenges to general surgeons practicing in resource-limited countries. In patients presenting with hematuria, ultrasound is useful initial imaging modality as it shows reasonable sensitivity and specificity in identifying cause of hematuria.[9] The most common cause of hematuria is carcinoma urinary bladder. Bladder cancer is a world wide problem, at any point in time 2.7 million people have a history of urinary bladder carcinoma. Cancer of the bladder is estimated to be the 9th most common cause of cancer world wide and 13th most numerous cause of death from cancer.[10]

Ultrasound in carcinoma urinary bladder, may reveal a polypoidal mass within the urinary bladder lumen, sessile mass or diffuse thickening of the bladder wall.. Adjacent organ invasion, most commonly involving the perivesical fat is sometimes present at diagnosis. Para aortic and iliac lymphadenopathy, hematogenous metastases, and peritoneal metastases may also be seen. Because most patients present with advanced disease, the prognosis is poor.[11]

This study was conducted and results were shared with other health professionals so that they can clinically diagnose carcinoma urinary bladder in hematuria at early stage, using the information (given by study) or knowledge in their mind, thus reducing morbidity and mortality due to carcinoma gallbladder.

I included a total of 207 patients with the clinical suspicion of carcinoma urinary bladder in my study. Out of these patients 155 turned out to have carcinoma on histopathology. Ultrasound picked 148 cases. Ultrasound could not pick 7 cases due to multiple reasons. This is comparable to the study done by the Konstantino S. et al[12] who also showed that in 34 patients (87.1%) ultrasonography accurately diagnosed tumor while in 5 patients it failed to clearly diagnose bladder carcinoma. Ultrasound could not diagnose 7 cases. Out of these 4 tumors were less than 5mm, 2 were mis diagnosed as vesical stones and one was and one was located in bladder diverticulum. This is also comparable to the study done by Rafique M,[13] who also failed to pick 4 cases 3 due to small size and 1 mis reported as vesical stone. Out of the 155 patients of carcinoma urinary bladder, n=117 (75.5 %) were males while n=38 (24.5%) were females which is comparable to the study of Rafique M.[13] who also showed a 3:1 distribution of

urinary bladder cancer among males and females.

Age group as analyzed among 207 patients, and the age range came out to be 22-86 with average age of 54.75 years which is comparable to the study done by Francica G et al[14] who also showed age range of 33-88yrs. In my study most of the patients with carcinoma urinary bladder n=78 (50%) were in the age range of 51-70 years of age which is comparable to the study of Cauroso G et al[15] in which the age range was 49-75 yrs.

Appearance of carcinoma urinary bladder on ultrasound was analyzed among 148 patients and n=121(81.7%) patients had polypoidal growth in urinary bladder, n=19 (12.8%) had sessile bladder growth where as n=5(5.4%) had diffuse wall thickening which is also comparable to the study done by Kocakoc E et al.[16] and Francica G et al.[14] who also showed similar distribution.

Ultrasound of urinary bladder play a key role in diagnosis of urinary bladder carcinoma. The sensitivity and specificity of ultrasound in diagnosis of urinary bladder carcinoma turned out to be 95.48 % and 61.54% respectively while it has positive predictive value of 88.1% and negative predictive value is 82.05%. Over all the diagnostic accuracy of ultrasound in diagnosis of urinary bladder carcinoma is 86.96%. This is also comparable to the study done by Islam T. et al[17] who showed the sensitivity and specificity of ultrasonography were 96.87% and 60% respectively. The accuracy of ultrasonography was 91.89%. Positive predictive value 93.39% and negative predictive value was 75%.

CONCLUSION

Ultrasound has an essential role in the evaluation of a patient with a clinical suspicion of hematuria. Urinary bladder carcinoma is highly aggressive malignancy and is common cause of hematuria in Pakistani men. Ultrasonography (US), which is readily available, non-invasive, and cost-effective, is the imaging modality of choice for urinary bladder carcinoma. Knowledge of the varied appearances of urinary bladder carcinoma on ultrasound, is important so that the diagnosis can be considered preoperatively. The ultrasound findings in advanced urinary bladder carcinoma reflect its behavior. Direct extension to the surrounding pelvic structures and perivesical fat, lymph node metastases, and hematogenous metastases are characteristic findings of advanced cancers.

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