



Comparison of detection rates of Ultrasonography and Computed Tomography for location and size of Urinary bladder carcinoma

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ABSTRACT

There are many imaging modalities like Ultrasonography, CT Scan or MRI scan for the detection of Bladder Tumor, but the final conclusive one is Cystoscopy, with the added advantage of possible biopsy. In this study, we compare the effectiveness of US and CT in detecting bladder tumors against the Cystoscopic findings. 137 cases were analysed in this study group. The results of this study suggest that both the tumor location and tumor size has an important role in the detection rates using both US and CT. The sensitivity of CT is more than US, especially in anterior bladder wall tumors and bladder neck lesions.

KEYWORDS :

1.Introduction:

Imaging modalities like ultrasonography (US) and computed tomography (CT) have been used to evaluate the patients with painless hematuria, especially when bladder tumors were suspected. However, it has been reported that some of the bladder tumors cannot be detected by these modalities, because of size of the tumor and its location. In this study, the effect of tumor size and location on the detection rates of US and CT were evaluated.

2.Objective:

To evaluate the detection rate of Ultrasonography and Computed tomography for location and size of bladder carcinoma.

3.Material and methods:

The study included 137 patients with bladder cancer admitted in our department between August 2014 and July 2016.

All these patients were evaluated by both Ultrasonography and Computed Tomography before performing cystoscopy. We retrospectively evaluated the US, CT, and cystoscopy reports of these patients from hospital records of patients.

The patients who had received neo-adjuvant chemotherapy, prior radiotherapy and those with contraindication for contrast injection for CT scan were excluded from the study. The bladder wall was divided into 6 separate regions: right & left lateral walls, anterior and posterior walls and the bladder base in addition to the bladder neck.

The tumor detection rates by US and CT were evaluated for location and lesion diameter with regard to the cystoscopy findings taken as the standard reference for comparison. All the ultrasonic examinations were performed using the same us scanner, a 3.5-mhz convex probe, with an adequately distended bladder, using the trans-abdominal route. The protrusion of the lesions into the bladder lumen and a local increase of bladder wall thickness were accepted as positive findings for tumor.

Contrast enhanced CT was performed using a spiral CT scanner. The axial cuts were taken at 5 mm interval, with the patient in the supine position. After filling the bladder, axial images were obtained before injecting the contrast material. Nephrographic and urographic phase images were obtained after the contrast injection.

Cystoscopy was performed in all patients, in a systematic fashion, with carefully examining all the six areas above mentioned. The anterior bladder wall behind the bladder neck was examined with the bladder partially filled and with one hand exerting pressure over the suprapubic area, to depress the anterior bladder wall, and a 70° lens

was used to visualize the anterior bladder neck. Other areas of bladder along with bladder neck were examined as per standard cystoscopy procedure.

The cystoscopic detection and confirmation was kept as reference (100%) and the detection rates of US and CT were compared with Cystoscopy as percentage of detection rate with regard to each area in bladder.

4.Results:

A.Detection rates – By Tumor Location:

a. Tumor location-by cystoscopy:

Cystoscopy revealed 195 lesions in 137 patients. The highest number of lesions detected were on right (48) and left lateral walls (54), followed by posterior wall (38).

Urinary bladder region	Total
Right lateral wall	48(24.6%)
Left lateral wall	54(27.6%)
Anterior wall	18(9.2%)
Posterior wall	38(19.4%)
Bladder base	26(13.3%)
Bladder neck	11(5.6%)
Total	195(100%)

b. Detection rate - Ultrasonography:

For those tumors detected cystoscopically, the detection rate by US is given below. US was able to find out 154 lesions only (78.9%) of the 195 lesions detected cystoscopically. The highest detection rate was for right and left lateral walls and posterior wall; and the lowest was for anterior wall.

Urinary bladder region	Total (With reference to the total number detected by cystoscopy)
Right lateral wall	39(81.2%)
Left lateral wall	43(79.6%)
Anterior wall	12(66.6%)
Posterior wall	31(81%)
Bladder base	21(80.7%)
Bladder neck	8(72.7%)
Total	154(78.9%)

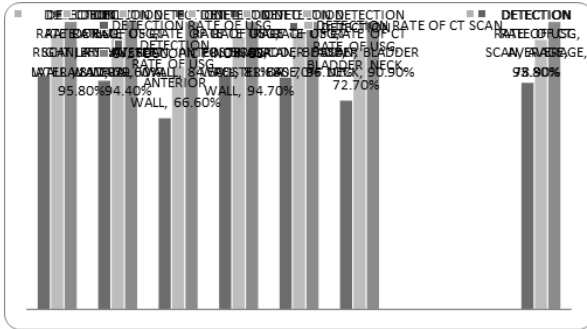
B. Detection rate - CT scan:

CECT was able to find 183 (93.8%) lesions out of all tumors detected by cystoscopy. The detection rate was more for right and left lateral walls. But CT was able to find out 84.6% of anterior wall lesions.

Urinary bladder region	Total (With respect to the total lesions detected by cystoscopy)
Right lateral wall	46(95.8%)
Left lateral wall	51(94.4%)
Anterior wall	15(84.6%)
Posterior wall	36(94.7%)
Bladder base	25(96.1%)
Bladder neck	10(90.9%)
Total	183(93.8%)

Comparison of detection rate-location – CT v/s USG

Overall, CECT was more sensitive in detection of bladder tumors compared to US alone. This was particularly important in the detection of anteriorly located tumors.



C. Detection rates-by tumor size:

a. Tumor size-By cystoscopy:

Cystoscopy revealed 195 lesions. Out of this, 50 (25.7%) were lesions smaller than 5mm, whereas, 145 (74.3%) were more than 5mm in size. Again, most of the lesions were in right and left lateral walls and posterior walls.

Urinary bladder region	Less than or equal 5 mm	More than 5 mm
Right lateral wall	11	37
Left lateral wall	10	44
Anterior wall	4	14
Posterior wall	12	26
Bladder base	10	16
Bladder neck	3	8
Total	50(25.7%)	145(74.3%)

b. Tumor Size –By USG:

USG could reveal only 154 lesions out of the 195 lesions detected by cystoscopy. Also, the detection rate of smaller tumors was significantly low as compared to larger lesions.

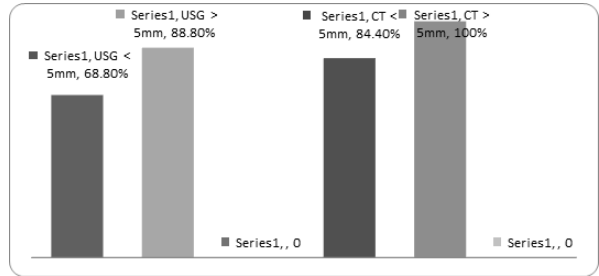
Urinary bladder region	Less than or equal To 5 mm	More than 5 mm
Right lateral wall	8(72.7%)	31(83.7%)
Left lateral wall	8(80%)	35(79.5%)
Anterior wall	0(0%)	12(85.7%)
Posterior wall	8(66.6%)	23(88.4%)
Bladder base	6(60%)	15(93.7%)
Bladder neck	1(25%)	7(87.5%)
Total	31(68.8%)	123(84.8%)

c. Tumor size – By CT SCAN:

CT was 100% sensitive for detection of tumors larger than 5mm in size, irrespective of its location. But was only 84.4% for lesions smaller than 5mm, even though this is significantly more than that for USG (68.8%)

Urinary bladder region	Less than or equal 5 mm	More than 5 mm
Right lateral wall	9(81.8%)	37(100%)
Left lateral wall	7(70%)	44(100%)
Anterior wall	1(25%)	14(100%)
Posterior wall	10(83.3%)	26(100%)
Bladder base	9(90%)	16(100%)
Bladder neck	2(66.6%)	8(100%)
Total	38(84.4%)	145(100%)

USG was accurate in finding out 68.8% of lesions smaller than 5mm and 88.8% of lesions larger than 5mm. Whereas CT scan could find out 84.4% of lesions smaller than 5mm and 100% of lesions larger than 5mm.



5. Conclusions:

The results of this study suggest that, both the tumor location and tumor size in the bladder has an important effect on the detection rates using both US and CT. In addition, USG had a low detection rate, especially for the bladder neck and anterior wall lesions; as well as for lesions smaller than 5mm. So US should not be used alone for imaging bladder tumors, because of its low detection rates at the anterior wall and for tumors less than 5 mm. Cystoscopy should be the preferred investigation for patients with hematuria who have negative findings on imaging with US or CT and also for the postoperative evaluation of bladder tumor.

6. References:

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