Correlation of Urinary Bladder Cancer with Stalk observed on 3-Tesla MRI with histopathological T Staging and cystoscopic findings: Comparison of Diffusion- and T2-weighted imaging in stalk detectability

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INTRODUCTION:

Clinical management of urinary bladder cancer is determined primarily on the basis of distinguishing superficial tumors (stage T1 or lower) from invasive ones (stage T2 or higher) because the treatment options differ considerably. Therefore, preoperative imaging studies would play an important diagnostic role if they could be used to precisely differentiate between the two categories of bladder cancer. Configuration of urothelial carcinoma usually reflects tumor behavior. Cystoscopically, approximately 70% of urothelial tumors are papillary, and 30% are non-papillary (1). Papillary urothelial carcinoma is known to have a loose connective tissue stalk histopathologically. For T staging of urinary bladder cancer on MRI, it is important to clearly separate the cancer from the bladder wall. Several previous studies have suggested that MRI at 1.5 T was useful for the detection of stalks and staging of bladder tumors (2-3). However, to our knowledge, there have been no previous reports to correlate urinary bladder cancer having a stalk with cystoscopic findings and to compare sequences in detectability of stalk. The purpose of this study was to correlate urinary bladder cancer having a stalk observed on 3-Tesla MRI with histopathological T staging and cystoscopic findings and to compare T2-weighted imaging (T2WI) and diffusion-weighted imaging (DWI) in stalk detectability.

MATERIALS AND METHODS:

Thirty-nine consecutive patients known to have or suspected of having urinary bladder cancer underwent MRI that included T2WI (TR/TEeff, 4,500/82; slice thickness 4 mm; FOV 220 mm; matrix 384 × 230) and DWI (TR/TE, 3,800/70; slice thickness 3 mm; FOV 350 mm; matrix 128 × 128; b-values, 50, 500, and 1,000 s/mm^2) using a 3 T whole body scanner (MAGNETOM Trio, A Tim 3.0T; Siemens Medical System, Erlangen, Germany) with a body-matrix coil and a spine-matrix coil.. Urinary bladder cancer was pathologically proven in all patients. The stalk on MRI was defined as a structure that extended from the bladder wall to the center of the tumor with signal intensity different from that of the tumor. The stalk was evaluated as present or absent, and the signal intensity (SI) in relation to the tumor was determined on T_2-weighted and DW images by two radiologists who were blinded to the pathology findings and the cystoscopic findings. We used pathologic stages documented in the official pathologic reports as the standard of reference. The frequency of the stalk detectability was tested using McNemar's test. The mean sizes of tumors between with a stalk and without a stalk on each sequence were compared using Mann-Whitney test.

RESULTS:

The pathologic stages were T1 or lower in 27 patients, T2 in six, T3 in three, and T4 in three. The cystoscopic findings were 23 papillary tumors and 17 non papillary tumors. The observers evaluated 11 tumors on T2WI (48%) and 17 tumors on DWI (74%) as having a stalk (P<0.03) (Table 1). All of tumors with a stalk on MRI were papillary tumors noted on cystoscopy. Non-papillary tumors did not show stalks on MRI. The observers evaluated 10 stalks on T2WI (91%) and 17 stalks on DWI (100%) as low SI (Figure 1). The remaining one stalk on T2WI (9%) was evaluated as high SI. Eleven tumors with a stalk on T2WI (100%) and 16 tumors with a stalk on DWI (94%) were T1 in the pathologic stage. The remaining one tumor with a stalk on DWI (6%) was T2 in the pathologic stage. The tumor measured 4.1–67.1mm in maximum size (mean 28.5 mm). The papillary tumors without a stalk were smaller than those with a stalk on MRI (P<0.05) (Table 2).

CONCLUSION:

Most of the bladder tumors with a stalk on 3-Tesla MR imaging were in T1 or lower pathologic stages. DWI had superior detectability in stalks of papillary bladder tumors to T2WI, particularly in tumors more than 10 mm.

Table 1 The frequency of the stalk detectability on T2WI and DWI

Cystoscopic finding	T2WI	DWI	*P* Value
Papillary tumor	11/23 (48%)	17/23 (74%)	0.03
Non papillary tumor	0/17 (0%)	0/17 (0%)	N.A

Table 2 The mean sizes of papillary tumors with a stalk and without a stalk

	tumor without stalk	tumor with stalk	*P* Value
T2WI	13.8 (4.1-23.5) mm	29.2 (12.8-67.1) mm	0.16
DWI	6.8 (4.1-13.7) mm	26.2 (16.7-67.1) mm	0.001

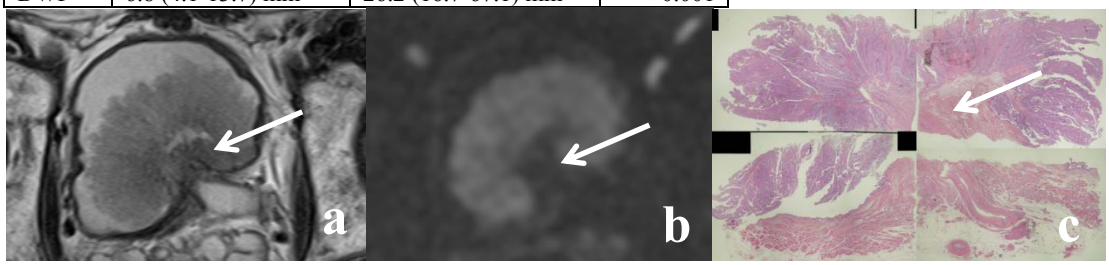

Figure 1 Stage pT1 papillary urothelial carcinoma in a 63-year-old man. (a) Axial T2-weighted image shows tumor with a low SI stalk (arrow) that extends from the posterior bladder wall to the tumor. (b) Axial DW image shows a low SI stalk (arrow) that is depicted clearly compared with T2-weighted image. (c) Microscopic findings. A stalk (arrow) extends from the bladder wall into the tumor. The stalk consists of fibrous tissues, capillaries, inflammatory cell infiltration and edema.

References

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