Incidental Diagnosis of Carcinoma of the Bladder Due to Uptake of ^{99m}Tc -MDP

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An 80-year-old male patient presented to the orthopaedist for evaluation of low backache. A bone scan was performed using 740 MBq (20 mCi) ^{99m}Tc -MDP. Whole-body planar images were acquired 3 h after injection (Fig. 1). The scan revealed normal physiological tracer uptake in skeletal system but irregular and heterogenous accumulation of tracer in the bladder (Fig. 2). To evaluate this abnormal accumulation further, the patient was given a dose of 40 mg furosemide and asked to drink

plenty of water. He was instructed to void three to four times within 2–3 h. After 3 h, the urine became less radioactive. An SPECT-CT image of pelvis was acquired, and the images revealed intense multifocal uptake in multiple bladder polyps (Figs. 3, 4). Urine cytology was done, which subsequently revealed malignant cells. Further evaluation with cystoscopic biopsy confirmed transitional cell carcinoma (TCC) of the bladder. Intra-operatively multiple broad based polyps were seen in the dome of the bladder. Transurethral resection of the

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Fig. 1 Anterior and posterior whole-body bone scan showing physiological uptake in skeleton but irregular accumulation in bladder

Fig. 2 ^{99m}Tc -MDP bone scan of anterior and posterior pelvic spot views highlighting the irregular accumulation in the bladder

Fig. 3 CT showing multiple bladder polyps; SPECT showing uptake in those polyps and the fused SPECT/CT image

Fig. 4 Transaxial SPECT-CT images showing intense ^{99m}Tc -MDP uptake in the bladder polyps and less radioactive urine. Corresponding CT images showing multiple bladder polyps

Fig. 5 **a, b** H&E photomicrograph at low magnification ($\times 40$) showing arborizing islands and cords of atypical urothelial cells dissecting and infiltrating the bladder musculature. **c** Photomicrograph at higher magnification ($\times 200$) showing mitosis and focal squamous differentiation

bladder tumors was done, and histopathology revealed arborizing islands and cords of atypical urothelial cells dissecting and infiltrating the bladder musculature (Fig. 5a, b). H&E photomicrograph at higher magnification ($\times 200$) showed mitosis and focal squamous differentiation (Fig. 5c).

Soft tissue uptake of ^{99m}Tc -MDP is described in various benign and malignant conditions [1–4]. It is known to accumulate in adenocarcinoma of lung, primary breast cancer, and colonic carcinoma among others. The actual mechanism of uptake in the malignant lesion is not known. The postulated causes of ^{99m}Tc -MDP uptake in extraosseous neoplasms are numerous and include tumor vascularity, inflammation, local pH factors, altered calcium metabolism, hormonal influences and cell wall damage [4, 5]. Our case shows that TCC of the bladder was incidentally diagnosed due to MDP uptake in multiple bladder polyps detected on a bone scan done for low backache in an 80-year-old man.

This report also shows the importance of delayed imaging after diuretic administration.

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