《臨床報告》

Improvement of Findings on Bone Image in Prostatic Cancer Following Testosterone Potentiated ^{32}P Therapy

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Abstract Improvement of metastatic bone lesions on ^{99m}Tc-diphosphonate bone scanning is demonstrated in a patient of prostatic cancer following the treatment of testosterone potentiated radiophosphorus.

Index terms: Prostate, prostatic cancer, metastatic Bone, bone scan, metastatic, Agents, radiophosphorus, testosterone, ^{99m}Tc-diphosphonate.

Since Subramanian and McAfee (1. 2) prepared technetium-99m polyphosphate complexes for bone imaging in nuclear medicine, many disease entities causing an increased uptake of bone seeking radiopharmaceuticals have been reported (3, 4, 5, 6). Skeletal metastatic foci in the prostatic carcinoma are sure to be abnormally accumulated by the bone seeking radiopharmaceuticals (7, 8). However, evaluation of destruction and regeneration of the involved metastiatic bone lesions after ^{32}P therapy with or without testosterone priming has been carried out mostly by the X-ray examination (9, 10, 11, 12).

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Authors have experienced a case of the prostatic cancer with multiple osseous metastases which presented not only dramatic relief of generalized bone pain also improvement of the abnormal bone images with ^{99m}Tc-diphosphonate following testosterone priming ^{32}P therapy.

Case Report

M.C. a 69-year-old man was admitted on July 10, 1974 to our nuclear medicine service for chief complaints of increased and intolerable generalized pain caused by osseous metastases of the prostatic cancer.

He first noticed a chest pain on February, 1968 and had chest X-ray examination which revealed osteoplastic metastatic lesions of the left fourth rib. A primary focus was searched and prostatic cancer was diagnosed by the transurethral biopsy of the prostate. He received orchiectomy on April, 1968 and was followed by 30 mg hexestrol diphosphate daily. He was fairly free of symptoms for about five years. But he was readmitted to the urology service of the Kanazawa University Hospital on December 21, 1973 because of increased lumbar pain and dysuria. He had a transient palliation of pain and dysuria following testosterone but he ceased responding to testosterone and was bedfast with severe generalized pain until admission to our nuclear medicine service.

Anterior and posterior scintiphotoes of a whole body with Picker Dynacamear IIc by intravenous

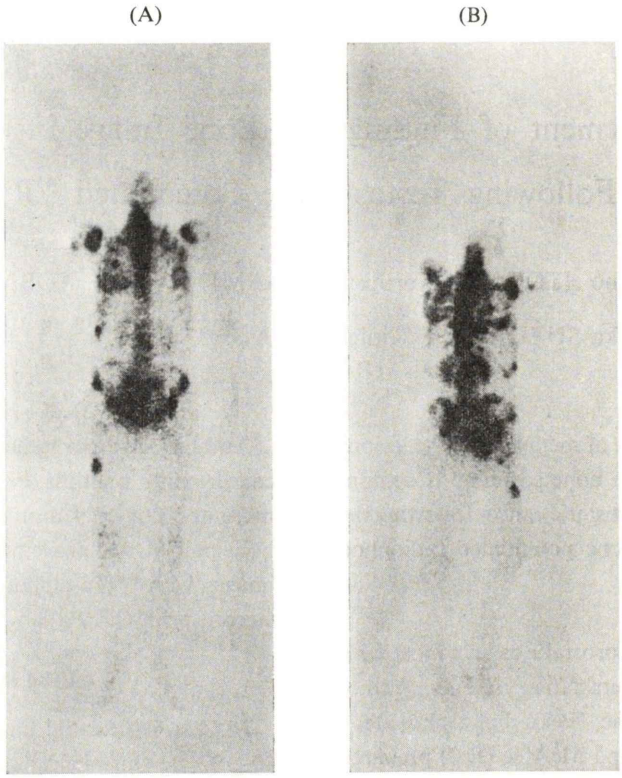

Fig. 1 ^{99m}Tc diphosphonate whole body images (anterior view (A), posterior view (B)) a week before therapy demonstrate multiple abnormal areas of increased uptake in the right scapla, bilateral rib, the both pelvic bones and the right femur as well as diffusely increased accumulation in the thoracic and lumbar vertebrae.

injection of 10 mCi of ^{99m}Tc-diphosphonate a week before the starting of ^{32}P therapy revealed multiple disseminated abnormal accumulations over general bones, except skull and bones of upper extremities (Fig. 1). Following Edland's technique (13) ^{32}P were given intravenously 1.5 mCi for seven days. A total dose of ^{32}P administered amounted to 10.5 mCi. Administration of 100 mg testosterone cypionate daily were started five days prior to ^{32}P therapy and continued for fifteen consecutive days. He had dramatic relief of pain on the third day after the initiation of ^{32}P administration in the form of sodium phosphate. Repeat scintiphotoes performed 6 weeks after completion of ^{32}P therapy showed reduction of uptake of the former abnormal bone lesions, with exception of three lesions, right rib, right iliac bone and right femur (Fig. 2).

The comparison of clinical laboratory findings was taken between the beginning and the end of ^{32}P therapy. The following findings showed decreased value; acid phophatase (Bessy-Lowry unit) 3.44 to 0.33, LDH (Wroblewski unit) 623 to 424, blood urea nitrogen (mg per dl) 51 to 25, creatine (mg per dl) 1.7 to 0.8, uric acid (mg per dl) 13.5 to 9.7, W.B.C. (/mm^3) 10200 to 7000, respectively. Alkaline phophatase (Bessy-Lowry unit), however, was only one of findings which showed increased value of 5.1 to 7.1. Other laboratory findings were less changed within normal.

Discussion

It is generally accepted now that the bone scan with ^{99m}Tc-tagged phosphate compounds is the

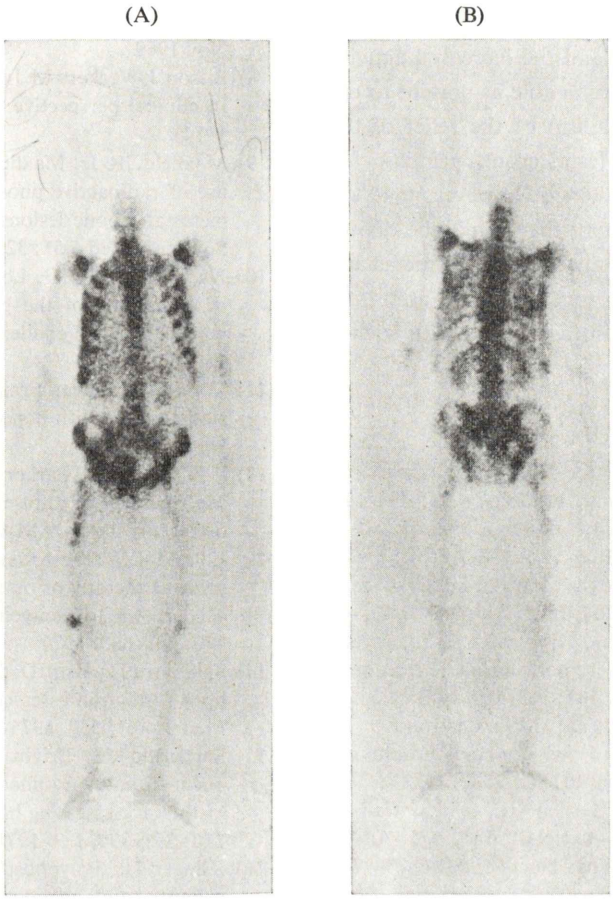

Fig. 2 ^{99m}Tc diphosphonate whole body images (anterior view (A), posterior view (B)) six weeks following the testosterone priming ^{32}P therapy show abnormal areas of increased uptake in the right lower rib, the right pelvic bone and the right femur. However, improvement of abnormal areas of increased accumulation seen on Fig. 1 is clearly demonstrated.

excellent diagnostic method nicely to demonstrate the metastatic lesions at the early stage when radiographic methods still give negative results (14). However, there are only few reports, which refer to the adaptation of the bone scan with ^{99m}Tc-phosphate compounds to follow up the effect of testosterone potentiated ^{32}P therapy in patients with metastatic foci of the bones (15, 16).

Radiographic evaluation of metastatic bone lesions from prostate before and after ^{32}P therapy has been reported and regeneration of the lesions has been revealed on X-ray film in one to three months after the completion of ^{32}P therapy (9, 10, 11, 12). It should not be surprising, therefore, that the ^{99m}Tc-diphosphonate whole body scintiphotoes obtained six weeks after the testosterone priming ^{32}P therapy in this patinet revealed improvement of the abnormal bone image. However, we are not sure whether such changes on the bone image might be produced by sufficient cancerocidal radiation dose given to metastatic lesions of the bone. It has been reported that ^{32}P administered was more accumulated around the metastatic bone lesion than neoplastic tissue itself (12).

It has been found that the accumulation mechanism of ^{99m}Tc-phosphate compounds to the meta-

static bone foci is due to the hyperemia around the lesion of the bone (17) and the increased activity of the osteoblast. We are unable at present to explain exactly the mechanism of the relief of the bone pain following testosterone priming ^{32}P therapy. It can be presumed, however, that the relief of pain is so prompt that it may be due to amelioration of hyperemia around the metastatic foci of the bones and improvement of the abnormal bone images may be also associated with such a factor.

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要　約

男性ホルモン併用 ^{32}P 治療に骨イメージの改善を認めた前立腺癌多発性骨転移の一症例

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多発性骨転移の為に耐えがたい治療抵抗性骨疼痛を有する前立腺癌患者に対し，疼痛緩和及び骨転移巣の改善を目的として男性ホルモン（テストステロン）導入による ^{32}P 治療を施行した．使用後，約3～4日目に劇的な骨疼痛の改善を認め，さらに約1ヶ月後の骨イメージにも改善が認められた．これまで，骨スキャンが骨転移の早期発見に非常に有効であるとされているが，本症例の如く骨転移病巣の治療効果の判定にも役に立つ可能性が考えられ，興味ある症例と思われたので報告した．尚，^{32}P 治療によると思われる重篤な副作用は認めなかった．