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Study on Co-Relation of Prostate Specific Antigen with Metastatic Bone Disease in Prostate Cancer on Skeletal Scintigraphy

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Abstract : Objective: To evaluate the ability of serum concentration of prostate specific antigen between two cutting points considering it as a predictor of skeletal metastasis on bone scintigraphy in men with prostate cancer. Settings: This study was carried out in department of Nuclear Medicine at Sindh Institute of Urology and Transplantation (SIUT) Karachi, Pakistan. Materials and Method: From August 2013 to November 2013, forty two (42) consecutive patients with prostate cancer who underwent technetium-99m methylene diphosphonate (Tc-99mMDP) whole body bone scintigraphy were prospectively analyzed. The information was collected from the scintigraphic database at a Nuclear medicine department Sindh institute of urology and transplantation Karachi Pakistan. Patients who did not have a serum PSA concentration available within 1 month before or after the time of performing the Tc-99m MDP whole body bone scintigraphy were excluded from this study. A whole body bone scintigraphy scan (from the toes to top of the head) was performed using a whole-body Moving gamma camera technique (anterior and posterior) 2–4 hours after intravenous injection of 20 mCi of Tc-99m MDP. In addition, all patients necessarily have a pathological report available. Bony metastases were determined from the bone scan studies and no further correlation with histopathology or other imaging modalities were performed. To preserve patient confidentiality, direct patient identifiers were not collected. In all the patients, Prostate specific antigen values and skeletal scintigraphy were evaluated. Results: The mean age, mean PSA, and incidence of bone metastasis on bone scintigraphy were 68.35 years, 370.51 ng/mL and 19/42 (45.23%) respectively. According to PSA levels, patients were divided into 5 groups < 10ng/mL (10/42), 10-20 ng/mL (5/42), 20-50 ng/mL (2/42), 50-100 (3/42), 100- 500ng/mL (3/42) and more than 500ng/mL (0/42) presenting negative bone scan. The incidence of positive bone scan (%) for bone metastasis for each group were O1 patient (5.26%), 0%, 03 patients (15.78%), 01 patient (5.26%), 04 patients (21.05%), and 10 patients (52.63%) respectively. From the 42 patients 19 (45.23%) presented positive scintigraphic examination for the presence of bone metastasis. 1 patient presented bone metastasis on bone scintigraphy having PSA level less than 10ng/mL, and in only 1 patient (5.26%) with bone metastasis PSA concentration was less than 20 ng/mL. therefore, when the cutting point adopted for PSA serum concentration was 10ng/mL, a negative predictive value for bone metastasis was 95% with sensitivity rates 94.74% and the positive predictive value and specificities of the method were 56.53% and 43.48% respectively. When the cutting point of PSA serum concentration was 20ng/mL the observed results for Positive predictive value and specificity were (78.27% and 65.22% respectively) whereas negative predictive value and sensitivity stood (100% and 95%) respectively. Conclusion: Results of our study allow us to conclude that serum PSA concentration of higher than 20ng/mL was the most accurate cutting point than a serum concentration of PSA higher than 10ng/mL to predict metastasis in radionuclide bone scintigraphy. In this way, unnecessary cost can be avoided, since a considerable part of prostate adenocarcinomas present low serum PSA levels less than 20 ng/mL and for these cases radionuclide bone scintigraphy could be unnecessary.

Keywords : bone scan, cut off value, prostate specific antigen value, scintigraphy
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