Visualization Of A Bronchial Carcinoma With Its Soft Tissue And Bone Metastasis Using Tc99m-Tetrofosmin

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O.M.Ü. Tip Fakültesi, Nükleer Tip ve Göğüs Hastalıkları Anabilim Dali

✓ Az diferansiyeye epidermoid kanserini bir hastada tümörün yanı sıra yumuşak doku ve kemik metastazlarında artış 1.2-bis[2-etoxyetil] fosfin eterine (Tc-99m Tetrofosmin) akımı gösterilmiştir. 740 MBq (20 mCi) Tc-99m Tetrofosmin intravenöz yoldan enjekte edildikten sonra 30 dakikalık dinamik, 30-35. ve 85-90. dakikalarda statik görüntüler ele edilmiştir, maksimum konsantrasyon pikine her üç lezyonda da ilk iki dakika içerisinde ulaşılmıştır. Enjeksiyon sonrası 30-35 ve 85-90 ci dakikalarda tümör, kemik ve yumuşak doku metastazlarında lezyon/kontralateral normal doku tutulum oranları 1.62, 1.41, 3.11 ve 1.43, 1.22, 1.80 olarak saptanmıştır. Tc-99m Tetrofosmin'in tümörün yanısra metastazlarında da akımıyle olması, buajan ile tümör görüntülenenin alanda yapılcak daha ileri çalışmaların gerektğini desteklemektedir.

Anahtar Kelimeler: Tc-99m Tetrofosmin-Bronş kanseri - Akıklığı tümörü metastazi

✓ Increased uptake of 1.2-bis[2-etoxyetil] fosfin eterine (Tc-99m tetrofosmin) in tumor as well as its soft tissue and bone metastasis was demonstrated in a patient with poorly differentiated squamous cell carcinoma of the lung. 740 MBq (20 mCi) of Tc-99m tetrofosmin was injected intravenously. Following an initial dynamic acquisition of 30 minutes, static images were obtained at 30-35 and 85-90 minutes post injection (p.i.). Time to peak concentration in all three lesions was achieved within the first two minutes. Lesion to contralateral normal tissue uptake ratios of tumor, bone and soft tissue metastasis at 30-35 minutes and at 85-90 minutes p.i. were 1.62, 1.41, 3.11 and 1.43, 1.22, 1.80 respectively. We conclude that accumulation of Tc-99m tetrofosmin in tumor and metastasis at once is an encouraging finding and justifies further investigations using this agent in the domain of tumor imaging.

Key Words: Tc-99m Tetrofosmin-Bronchial Carcinoma-Lung Tumor Metastasis

1.2-bis [2-etoxyetil] fosfin eterine (Tc-99m tetrofosmin) is a recently developed diphosphine for myocardial perfusion imaging. It belongs to a new class of Tc-99m labeled lipophilic cations, which employ a diphosphine ligand[1]. The reported comparative studies up to date communicate high accuracy in the detection of coronary artery disease, similar to T1-201[2,3]. Accumulation of the myocardial perfusion agents T1-201 and Tc-99m-MIBI in tumor tissue and in metastasis has been reported by various authors[4-9]. Recently, uptake of Tc-99m tetrofosmin in malignant tissues has also been described[10,11,12]. We report a case of Tc-99m tetrofosmin uptake in a squamous cell carcinoma of the lung as well as in its soft tissue and bone metastasis.

CASE REPORT

A 50-year-old female was admitted to hospital with back and shoulder pain. Chest x-ray (Fig. 1A) and computed tomography revealed a 6x3.5 cm lesion in the inferior lobe of the right lung. A poorly differentiated squamous cell carcinoma was diagnosed by the following bronchoscopic biopsy. The Tc-99m-MDP scan detected multiple bone metastasis, which were localized most intensively in the left shoulder joint region.
Moderately active lesions of smaller size were visualized in the left humerus, several costae and vertebral column. The CT exploration of the left shoulder region located 6x8 cm solid mass above the acromio-clavicular joint (Fig. 2). Histopathological examination of the biopsy specimen diagnosed soft tissue metastasis.

were obtained. Besides the increased tracer accumulation in the lung tumor, localized increased uptake in soft tissue and bone metastasis of the left shoulder was observed (Fig. 3). By assigning ROI’s over the tumor, bone and soft tissue metastasis as well as over the corresponding contralateral normal uptake sites, the time to peak concentration, Tc-99m tetrofosmin washout rate at 30 minutes post injection and lesion/contralateral normal uptake ratios at 30-35 as 85-90 minutes were calculated for all three sites (Table 1 and Table 2).

One week after the bone scan, Tc-99m tetrofosmin study was performed. Following the intravenous injection of 740 MBq (20 mCi) of the tracer, two dynamic acquisitions (60x1 second frames followed by 30x1 minute frames) were performed. Anterior static images at 30-35 and 85-90 minutes

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<th>Table 1: Tc99m-Tetrofosmin kinetics in tumor and metastasis</th>
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<td>Time to peak concentration</td>
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<tr>
<td>Tumor</td>
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<td>Bone metastasis</td>
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<td>Soft tissue</td>
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<td>Metastasis</td>
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Table 2: Lesion/Contralateral normal tissue uptake ratios of Tc99m-Tetrofosmin

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<th>30 – 35 minutes</th>
<th>85 – 90 minutes</th>
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<tr>
<td>Tumor/CNL</td>
<td>1.60</td>
<td>1.43</td>
</tr>
<tr>
<td>Bone met./CNB</td>
<td>1.41</td>
<td>1.22</td>
</tr>
<tr>
<td>Soft T. met./CNST</td>
<td>3.11</td>
<td>1.80</td>
</tr>
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*CNL = Contralateral normal lung.
CNB = Contralateral normal bone.
CNST = Contralateral normal soft tissue.

and the yet reported accuracy similar to T1-201 announce a new challenger for the other technetium tracers MIBI and Teboroxime\(^2,3\). Uptake of myocardial perfusion tracers T1-201 and Tc99m-MIBI in malignant lesions was a subject of investigation in the recent years\(^4,5,6\). Accumulation of these two tracers in metastatic tissue has been reported as well\(^7,8,9\). Tc-99m tetrofosmin uptake in brain tumors has been reported by Soricelli et al.\(^10\) and accumulation in malignant lung tumors has been first documented by our department\(^11\). Recently, a case of metastasis detection in differentiated thyroid carcinoma has been reported\(^12\). In this present case, simultaneous visualization of a lung tumor as well as its soft tissue and bone metastasis was an encouraging finding. It was observed that only the bone metastasis showing the most intensive MDP uptake could be visualized using Tc-99m tetrofosmin. The time to peak concentrations within the first two minutes indicate a relation between the increased accumulation of Tc-99m tetrofosmin and increased blood flow in malignant tissues. Tumor uptake mechanism of Tc-99m Tetrofosmin and clinical usefulness of this agent in lung tumor imaging remains to be researched.

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