

Bone Scintigraphy Blood Pool SPECT-BT in Benign Lesions of Costae

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Abstract

Aim: This study aims to determine the possible role of blood pool SPECT/CT imaging in benign lesions of the costae.

Materials and Methods: Seventeen patients (8 M, 9 F, 50 ± 19.36 years old) were included who presented with mass or pain in the costae region were included. The scintigraphy, SPECT, and SPECT/CT in the blood pool and late phase were performed and analyzed retrospectively.

Results: Additional SPECT-CT imaging increased the diagnostic accuracy of the bone scintigraphy by significantly increasing sensitivity and specificity.

Conclusion: Although the number of cases is low, this preliminary result showed significantly increased diagnostic accuracy in diagnostic power of scintigraphy by adding SPECT-CT to the imaging workflow.

Keywords: bone scintigraphy, costae, rib, benign, SPECT/CT.

Introduction

The scintigraphic imaging in the costae region has demonstrated sufficient results in previous studies (1). The recent technical development of SPECT/CT provided higher diagnostic accuracy in evaluating bone lesions in previous studies (2-5). The blood pool phase of the bone radionuclide imaging usually needs to be sufficiently documented. However, the determination of osteomyelitis and inflammatory bone diseases depends on these phases of bone scintigraphy. This study aims to determine the additional diagnostic efficiency of blood pool SPECT/CT imaging in bone scintigraphy performed for benign costae lesions.

Materials and Methods

Seventeen patients (8 M, 9 F, mean: 50 ± 19.36 years old) were included in the study. The patients' informed consent was obtained, and the Ethic Committee approved the study. Planar bone scintigraphy in an early and late phase was obtained by administration of approximately 20 mCi of Tc-99m HMDP adjusted according to the body weight. Dynamic, static planar, SPECT, and SPECT-CT images were obtained and analyzed in nearly

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half of the patients (n: 5). The images were analyzed by an experienced Nuclear Medicine physician retrospectively. The imaging findings were compared with clinical follow-up results and pathology results in some cases.

Results

The imaging results showed higher diagnostic accuracy, sensitivity, specificity, negative and positive predictive value in additional SPECT-CT imaging as demonstrated in Table 1. The lesions included in this analysis were usually acute or chronic fractures except for one patient who had fibrous dysplastic lesion according to pathology results (Figure 1).

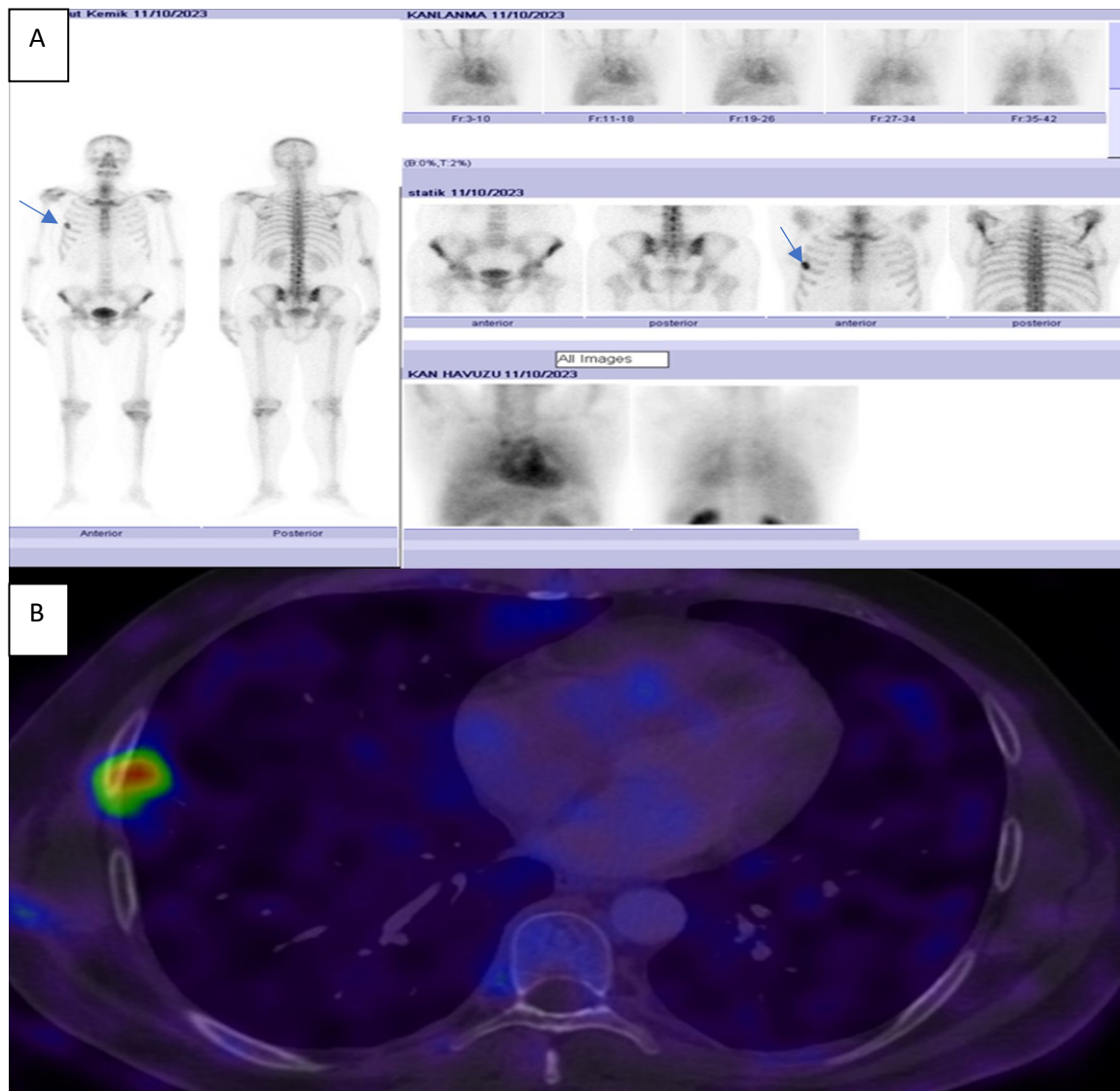


Figure 1. Planar whole body anterior posterior projection bone scintigraphy (A) and thoracal SPECT-CT imaging results (B) showing significantly increased bone tracer uptake at right 7th costae with pathological result concluding fibrous dysplasia.

Table 1. The diagnostic sensitivity, specificity, accuracy, negative and positive predictive value of imaging modalities.

	Planar	SPECT	SPECT/CT
Sensitivity	66%	85.7%	100%
Specificity	90%	88.9%	88.9%
Accuracy	81.3%	87.5%	93.8%
NPV*	80%	85.7%	87.5%
PPV**	81.8%	88.9%	100%

*NPV: Negative predictive value,

**PPV: Positive predictive value.

Discussion

According to the results of this analysis bone scintigraphy is highly specific but not sensitive in benign costa lesions determination. However additional SPECT-CT imaging significantly improves the diagnostic accuracy of the imaging modality.

In a previous study including 237 subjects with benign and malignant costa lesions the diagnostic role of bone scintigraphy and SPECT/CT were significantly different in benign costa lesions (2). Same study pointed out significant increase in the diagnostic accuracy by including SPECT/CT in bone scintigraphy (2). In a different series including 444 subjects with oncologic diseases also SPECT/CT yielded incremental increase in the diagnostic classification and reduction in equivocal results with significant reporter confidence (3). In another study about the indeterminate results in bone scintigraphy 63% of the findings were benign lesions on CT of the SPECT/CT (4). However, despite additional SPECT/CT imaging there were 8% of the lesions with indeterminate results in that study and those lesions were the rib lesions (4). In a series of prostate cancer patients 151 lesions determined to be benign according to SPECT/CT results (5) which has significantly increased the diagnostic accuracy.

In a recent study about the 38 tumor patients with atraumatic costal cartilage fractures has concluded that these lesions have specific appearance and SPECT/CT has excellent diagnostic power in determining them (6). Fibrous dysplasia which was the benign lesion of the ribs in this study in a patient might be mimicking malignancy in special circumstances (7). Another study about the risk of rib lesions in breast cancer patients the bone scintigraphy results showed that the malignancy incidence is increased in these patients (8).

Limitations of this study is the retrospective manner and limited number of cases. The issue has to be evaluated by means of larger series in the future.

