

Role of Diffusion-weighted MR Imaging in comparison with PET/CT Imaging for Lymph Node Detection of the Abdomen and Pelvis

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Introduction

Lymph nodes status in various carcinoma of abdomen and pelvis is important in therapeutic planning. The detection of metastasis in lymph nodes has been performed with various diagnostic imaging modality, but there is a little evidence of the performance of each modality. Although 18F-FDG PET/CT images (PET) is used as whole body metastasis survey, employment of diffusion weighted MR images (DWI) with both abdomen and pelvis acquisition has been established gradually. The purpose of this study was 1) to evaluate the visualize capability of lymph nodes metastasis using DWI and/or PET and 2) to investigate the role of DWI in comparison with PET, routinely performed in patients with abdominal and pelvic carcinoma and using size criterium to define nodal metastases, in assessing lymph node status.

Materials and Methods

This retrospective study was performed on 117 consecutive patients (66 males and 51 females) who had been examined both DWI and PET in the Tokushima University Hospital from November 2005 to October 2006. A selected group of 44 patients (24 males and 20 females) who presented lymph nodes clinically suggestive of metastasis was analyzed. Local ethics committee approval was granted and informed written consent was obtained from all patients before the examination. All studies were performed with a 1.5T clinical scanner (Signa Excite HD 1.5T; GE Medical System) with a 8 channel body array coil and PET/CT clinical scanner (Aquiduo; Toshiba Medical Systems). DWI was performed with SE-EPI with 3 axis MPG pulses ($b=800\text{s/mm}^2$) using respiratory gating in the abdomen and free breathing in the pelvis. Total amount of 18F-FDG was calculated by body weight (kg) $\times 3.7\text{MBq}$ in each patient, respectively. PET and CT images were scanned one hour after from the administration of 18F-FDG. In this study, these three matter were analyzed; 1) The kinds of primary tumor of the subjects, 2) Visualize capability of lymph nodes using DWI in comparison with PET and 3) Visualize capability of lymph node caused by the size of itself. The diagnosis of lymph node metastasis was performed by radiologists using all images including enhanced CT and MR studies and the size of lymph node was measured by CT images.

Results and Discussions

The results of our study were shown in table 1. The total amount of lymph nodes detected in the selected subjects (44 patients) was 101. All of detected lymph nodes by PET were visualized by DWI and there was no lymph nodes visualized by PET only. The detected lymph nodes were classified by the size (1 cm of diameter) as shown in table 2. This demonstrated low detectability of lymph nodes less than 1cm of diameter by PET compared to DWI. In the PET study, it is known that the uptake ratio of 18F-FDG has been depended on the size of tumor. This result suggested that the DWI has an advantage of lymph node detectability especially in the sizes of less than 1cm diameter. Examples of both cases were shown in fig.1 and 2. Fig.1 shows the case of DWI(+) and PET(+), rectal carcinoma of 80y.o. male. Fig.2 shows the case of only DWI(+), pancreatic carcinoma of 81y.o. male.

Conclusions

In our retrospective study, all lymph nodes detected by PET and more can be visualized by DWI. It is suitable for the screening study of lymphnodes metastasis to avoid failure to notice in clinical routine diagnosis even if its specificity for malignancy was not high.

Table 1 Clinical and Imaging data

Primary tumor	subjects	DWI (+), PET (+)		DWI (+), PET (-)		DWI (-), PET (+)	
		subjects	lymph nodes	subjects	lymph nodes	subjects	lymph nodes
Colonic carcinoma	12 (27.3%)	6	8 (16.0%)	8	19 (37.3%)		
Rectal carcinoma	7 (15.9%)	5	10 (20.0%)	3	7 (13.7%)		
Cholangiocarcinoma	6 (13.6%)	6	15 (30.0%)	1	1 (2.0%)		
Pancreatic carcinoma	5 (11.4%)	3	6 (12.0%)	3	9 (17.6%)		
Gastric carcinoma	5 (11.4%)	2	2 (4.0%)	3	5 (9.8%)		
Anal carcinoma	3 (6.8%)	2	4 (8.0%)	1	4 (7.8%)		
Gallbladder carcinoma	2 (4.5%)			2	5 (9.8%)		
Hepatic carcinoma	2 (4.5%)	2	2 (4.0%)	1	1 (2.0%)		
Splenic carcinoma	1 (2.3%)	1	2 (4.0%)				
Endometrial carcinoma	1 (2.3%)	1	1 (2.0%)				
Total	44	28	50	22	51	0	0

References

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Table 2 Detected lymph nodes selected by the sizes on the thresholds of 1cm diameter.

Size of lymph nodes	< 1cm	1cm = <
Detected by DWI	50	51
Detected by PET	9	41

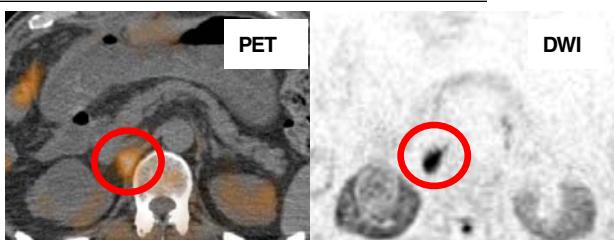


Fig.1 The case that was detected lymph node by both DWI and PET. (80y.o., male, rectal carcinoma)

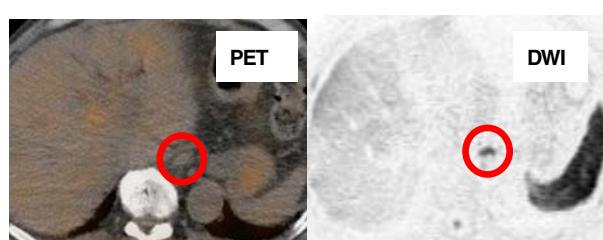


Fig.2 The case that was detected lymph node by DWI only. (81y.o., male, pancreatic carcinoma)