Additional value of image fusion between MR and PET for initial staging in patients with head and neck cancer: Preliminary results.

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Background

Magnetic Resonance (MR) imaging is widely used in patients with head and neck cancer for staging before treatment (1). Meanwhile, positron emission tomography (PET) using fluorodeoxyglucose (FDG) has been also accepted as a functional imaging tool in this field (2). Recently, an inline PET-CT system has been developed, and some reports have demonstrated its clinical usefulness for staging in head and neck cancer (3). It is expected that image fusion between MR and PET has some advantages in the head and neck field, but it remains unknown if it can really yield higher diagnostic accuracy, as compared with interpretation of MR images only. The purpose of this study was to assess the clinical value of manual fusion of PET with MR images for initial staging in patients with head and neck cancer.

Patients and methods

Twenty-eight patients (M:F=21:7, mean age 64 years old) who had been suspected of having head and neck cancer and underwent MR and PET scans within 20 days were included in this study. First, MR images were interpreted without any clinical information for evaluating primary site and lymph node metastasis. Then, MR and PET images were merged on a workstation using software (AquariusNetStation, TeraRecon, Inc.), and fused images were read in a same manner (MR+PET). Final diagnoses were obtained, based on histopathological findings in all patients, and diagnostic accuracy was compared between the two methods.

Results

Of 28 patients, malignant tumors were confirmed in 26 patients, and 2 patients had benign disease, according to the histopathological examinations. Among the 26 malignant cases, lymph node metastasis was positive in 9 cases. Of these 26 patients, there were no diagnostic discrepancies between MR and MR+PET interpretations in 24 patients. In the remaining 2 patients, in which findings were different, left gingival cancer was accurately diagnosed only in MR+PET interpretation in one patient (Figure, arrows), and one lymph node metastasis which was not FDG-avid was accurately read as positive only in MR interpretation in one patient with adenoidcystic carcinoma. In 2 benign cases, one case was accurately diagnosed as negative only in MR+PET interpretation due to the lack of FDG uptake, but the other case was diagnosed as falsely positive in both methods. For detecting primary tumors, the sensitivity of MR and MR+PET was 96% and 100%, respectively. For lymph node staging, sensitivity and specificity of MR were 89% and 94%, while those of MR+PET were 78% and 94%, respectively.

Conclusion

These preliminary data suggest that diagnostic accuracy was almost comparable between MR and MR+PET interpretations. Although the MR+PET interpretation yielded more true positive and true negative results for primary sites, additional value of image fusion between PET and MR might be small for preoperative staging in patients with head and neck cancer,

References

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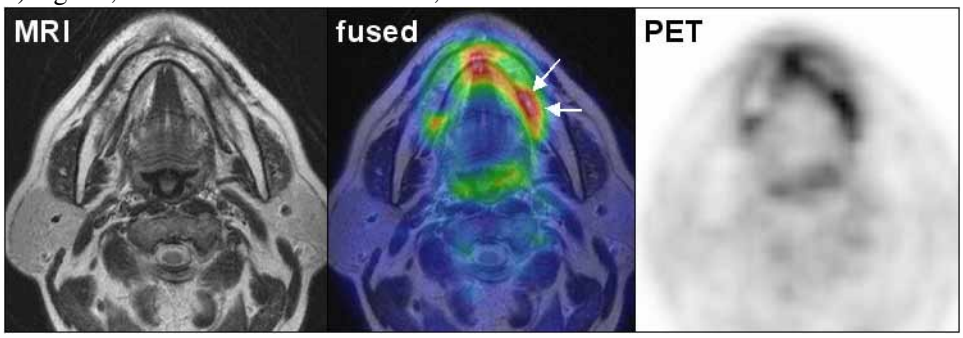

Figure.