Abstract—We propose a diagnostic information management system that manages and uses lesion location and diagnostic information to ensure there is a more efficient diagnosis and high quality report. The proposed system was implemented as a prototype system and experiments were performed in a hospital. The experimental results showed that the diagnosis time was equivalent or shorter than that of the existing system, and the report quality was evaluated by clinicians to be better than that from the conventional one.

I. INTRODUCTION

Radiologists have recently had to read a large number of images due to the advances in imaging modality. Meanwhile, detailed reports are required from the clinician. With the introduction of the Picture Archiving and Communication System (PACS), the efficiency of image diagnosis was improved [1]. Furthermore, the standard for diagnostic information exchange was proposed by using the DICOM [2] relevant to reporting. However, utilization of the diagnostic information in support of a diagnosis needs to be improved, because a radiologist typically has no time while a clinician requires an informative detailed report. We developed a diagnostic information management system for this study to efficiently create a detailed report by focusing on a "comparative reading" in a situation concerning multiple tumors. We have performed a proof of concept using some cases.

II. METHOD

We propose a system that represents the lesion location as spatial coordinates to link the lesion information from the previous test with that from the current one. The diagnosis sequence using this system is shown in Figure 1. First, a radiologist reads the images from the previous and current tests to better understand the disease condition. Next, they can point out the lesion in the image from the current test by clicking it on display to store the location as spatial coordinates. After that, the developed algorithm links the lesions between the image of previous test and the image of current test to generate a unique lesion identifier, which enables for management of the information as a time series. The algorithm based on the vector of the relative position can be worked with using the spatial coordinates of the lesion. Then, a radiologist inputs the diagnostic information for each lesion. At this time some of the information can be traced from the previous test to the current one using the link information. Finally, a report can be automatically created, and the radiologists can confirm the report or edit it. We implemented the function mentioned above into a prototype system. Figure 2 shows a screenshot of the developed prototype system. We performed experiments in a hospital to measure the diagnosis time to investigate the availability of the system in clinical practice. This experiment was performed by a radiologist using 4 cases of multiple liver cancers to compare the diagnosis times when using the existing system (conventional PACS and text Report) with those when using the prototype system. After the experiments, we had interviews with four clinicians to evaluate the reports using a scoring method.

III. RESULTS AND CONCLUSION

The average diagnosis time when using the existing system was 161 sec and when using the prototype was 134 sec. The lesion linking succeeded for all the cases in this experiment. The average score of the four clinicians for the reports which were prepared in the diagnosis time experiment created by the prototype system was higher than that for the conventional one in all aspects. In particular, the biggest difference in score was for the clarity of the change in lesion in the time series. In this study, we proposed a management system for lesion location and diagnostic information to ensure there was a more efficient diagnosis and high quality report. The experiment showed that the diagnosis time was equivalent or shorter than that for the existing system, and the report quality was evaluated by clinicians to be better than that from the conventional one.

REFERENCES