Pickup effect of patients with potential radiotherapy indication by Radiographers: An institutional reports in Japan

Abstract:

Background: As there are fewer radiologists in Japan compared to Western countries, there is less opportunity to participate in conferences in each department to discuss the indications for radiation treatment, and in our hospital without a cancer board, there is no indication for radiation treatment There is a current situation under the judgment of each medical department.

Objectives: We picked up patients who were potentially candidates for radiotherapy when performing CT and MRI examinations. From among these, a radiotherapy specialist judged how much the indication of radiation therapy was, and examined the effect.

Materials and Methods: For CT and MRI examinations taken from November 2017 to May 2018, cases where radiotherapy was considered necessary were picked up. The radiotherapy specialist referred the medical record for the case and judged the indication of radiotherapy in the following classification. Not applicable for radiation therapy (currently under treatment) score 1; future radiation therapy potential 2 score, radiation therapy required future score 3 Grasp the trend of 4) score, the indication of radiation treatment immediately (contact your doctor) score 5.

Results: We picked up 52 cases for radiotherapy from CT and MRI. Among them, the score 1 was 16 people, the score 2 was 7 people, the score 3 was 15 people, the score 4 was 13 people, and the score 5 was 1 person. As for score 4, there were many spinal symptoms. With regard to a score of 5 in a medical department that cancer normally does not handle, there was a tumor in a part different from the examination purpose, and in some cases it was necessary to call the patient.

Conclusions: Indications for radiation therapy tend to increase year after year, and it may be very difficult to judge the indications for radiation treatment in departments that do not treat cancer frequently. It turned out that this examination leads to guidance guidance and enlightenment activity of radiation therapy for each medical department. Providing information from radiologists performing CT and MRI examinations to the radiotherapy department was considered to be very useful.
Introduction:

Currently, medical care in Japan is one of the tops in the world and further advanced and specialized. However, the number of radiologists in Japan is the lowest among developed countries. Therefore, it is difficult for medical departments such as internal medicine and surgery to determine whether or not a lesion is an indication for radiation therapy (RT). In comparison, trained radiological technologists may be able to determine if there is an indication for RT at the time of imaging.

It is common in the world that imaging examinations are ordered from the attending physicians and diagnostic radiologists interpret them. However, the number of diagnostic radiologists in Japan is short supply, and it may take time for an interpretation report to reach the attending physician. In addition, it may take longer depending on the patient's appointment status.

In Japan, no conclusions have yet been made regarding the appropriateness of Radiographer's interpretation assistance regarding nighttime and holiday interpretations with few doctors. In Europe and the United States, Radiographer has a system for primary interpretation, but it is not yet in Japan. However, there are also reports that primary readings by radiographers were useful for emergency medicine doctors. However, it is not clear to what extent the support will help the diagnostic radiologist.

On the other hand, some emergency diseases may include oncologic emergency. While Oncologists can determine urgency, it may be difficult for departments that do not treat cancer to determine if the image is oncologic emergency. Also, the symptoms caused by the tumor need to be dealt with urgently. Indications for emergency RT include brain metastases, neurological symptoms due to bone metastases, and superior vena cava syndrome. Consultation with a radiation oncologist is necessary immediately after the discovery of these lesions. In our hospital, patients who are likely to be eligible for RT from the radiological technologist were reported directly to the radiation oncologist after direct examination.

In this time, we prospectively examined how many patients were picked up by the radiological technologists and reported to the radiation oncologists. We also examined how effective the radiological technologist's quick report was.

Materials and Methods:

For CT and MRI examinations taken from November 2017 to May 2018, we picked up cases that may require radiation therapy. Three CT radiographers (4, 9, 18 years of experience) and
2 MRI radiographers (8.21 years of experience) performed the pickup. One of radiological technologists was attending a radiology conference and studying reading skills. For the cases, a 17-year-old radiation oncologist referred to the chart and judged the indication of radiation therapy according to the following classification. It was done in 5 steps about necessity and urgency.

1) No indication for radiation therapy (or currently under treatment)
2) Future potential for radiation therapy
3) Radiation therapy will be needed in the future
4) Review the images again a week later (to estimate the attending physician)
5) Immediate indication for radiation therapy (contact attending doctor by calling)

**Results:**
The number of score 1, 2, 3, 4, and 5 were 16, 7, 15, 13 and 1, respectively.
Table 1 shows the cases that were picked up and those that were given radiation treatment. Eighteen cases had indications for radiation therapy. Of these, nine had a history of radiation to the site in the past, and nine had subsequent radiation therapy. Example case with a score of 4 is shown in Figure 2. A mass invading the heart is found on CT. Bronchoscopy was performed and a diagnosis of squamous cell carcinoma was obtained, and emergency radiation was performed. Example case with a score of 4 is shown in Figure 3. Tumors invading the spinal cord at the level of the first lumbar spine are noted. The primary site could not be identified by whole-body CT, and emergency radiation was performed as a primary unknown cancer. After that, chemotherapy was performed as a cancer of unknown primary site and three months later, it was found to be metastasis due to breast cancer.

**Discussion:**
In Japan, radiologists rarely stay in the middle of the night. Ambe et al. Conducted surveillance on the primary interpretation of radiologists across Japan. The contents are as follows. In cases where advice from a doctor on duty is sought by the technician, not only cases with difficulty in interpretation such as intestinal ischemia or small amount of subarachnoid hemorrhage, but also acute subdural hematoma, cerebral hemorrhage, appendicitis, perforation of the digestive tract etc Cases that were relatively easy to read were included. Therefore, it is speculated that it is possible to reduce the oversight by primary reading of the technician. In addition, there are cases in which the engineer pointed out cases that the on-duty doctor did not recognize as abnormal, suggesting the importance of sharing information between the engineer and the doctor.
In the emergency situation, in the small-scale emergency facilities where the radiologist's reside is difficult or in the small-scale emergency facilities where the one on duty doctor system is large, the reading assistance including the advice is considered to be necessary to reduce the miss rate. This time, we examined the necessity of primary interpretation of the technologist in tumor-related disease, not in acute disease. As a whole, it was mostly picked up with mass disease abnormality. However, the proportion of malignant tumors among mass lesions is as high as 70%, and further scrutiny is often required. In Japan, surgery is often the first choice for mass malignancies, and chemotherapy is the first choice for lymphomas and such. Also, in cases where liver tumors or lung tumors metastasize from other malignancies, chemotherapy is given priority unless oligometastasis. However, even if chemotherapy is the first choice, radiation may be preceded if urgent treatment is required. In that case, it may be necessary for the radiotherapy physician to contact the attending physician. Also, in the case of cancer of unknown primary site, it is often the case that the attending doctor is not decided, and it is possible to advise the doctor who ordered the examination when it is considered that the radiation precedent is clinically required.

**Conclusion:**
Radiation therapy in Japan is not widespread among developed countries. Similarly, if we can advise at the stage of imaging the applicability of radiation therapy in Japan, we can accelerate the process of oncologic emergency. In particular, if you are looking at the patient in an outpatient clinic, you can pick up the potential emergency before the next visit.

**Figure Legends:**
Figure 1

![Figure 1](image1.png)

Figure 2
Figure 1
A large mass close against heart is detected.
The circumference does not have the inflammatory findings.

Figure 2
Body of vertebra with the osteolytic change is detected.
A metastatic tumor is strongly suspected.

Figure 3
Right column; number of patients
Under line; scoring from assigned by radiation oncologists
A; No eligible for radiotherapy
B; Attending physician consulted to radiation oncologist and radiotherapy was performed.
C; The tumor was already treated by radiotherapy

References:


