

Department of Radiology

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Research Activities

The division of diagnostic imaging

1. Multidetector-row computed tomography as a preoperative evaluation for partial hepatectomy

Liver parenchyma/volumetry, vascular structures, and the biliary system should be assessed before partial hepatectomy is performed. To establish an imaging strategy before partial hepatectomy, we obtain imaging data of the liver in both the arterial and portal phases with dynamic computed tomography (CT) after drip infusion cholangiography-CT. Both 2-dimensional (D) and 3D displays of the biliary system and vascular structures are provided to surgeons.

2. Evaluation of the lymphatic system of the trunk on heavily T2-weighted images

A study was performed to evaluate the usefulness of nonenhanced 3D heavily T2-weighted images obtained with 2D prospective acquisition and correction in the visualization of the lymphatic system of the trunk.

3. The timing of liver tumor imaging with Sonazoid

In a collaborative study with the division of gastroenterology and hepatology, department of internal medicine, we investigated the timing of liver tumor imaging with Sonazoid (Daiichi Sankyo, Tokyo), which is a second-generation sonographic contrast material. With a low mechanical index (MI) the ability of Sonazoid to depict the internal structure of blood vessels immediately after arterial injection was inferior to that of Levovist (Schering AG, Berlin, Germany), a first-generation conventional contrast medium, but with a high MI the sensitivity of Sonazoid was similar to that of Levovist. On the other hand, in focal nodular hyperplasia and adenoma, tumors were enhanced to a similar degree as was the neighboring liver parenchyma, whereas in hepatocellular carcinoma and angioma, tumors were depicted as contrasting deficits with Kupffer imaging 10 minutes after the injection of contrast media in the low MI reduction. These findings suggest that Kupffer imaging can be performed with an ultrasonographic contrast medium.

4. In collaboration with the division of rheumatology, department of internal medicine, we found that a change in the vascularity of the joint, as observed with color Doppler imaging, correlated with the condition of patients with rheumatoid arthritis and indicated the effect of treatment.

5. B flow ultrasonography for the diagnosis of renal artery stenosis: Clinical significance and comparison with other modalities

6. Fatty acid metabolism in the hearts of rats with renal failure

Cardiovascular disease is the best predictor of mortality in patients with chronic renal disease. The imaging of fatty acid analog is useful for diagnosing alterations of myocardial metabolism due to uremia and dialysis. We investigated the metabolism of iodine-125—labeled beta-methyl iodophenyl pentadecanoic acid (BMIPP) in the hearts of rats with renal failure. We compared the accumulation of I-125 BMIPP in the rat heart and pathological findings observed with transmission electron microscopy.

7. Multicenter trial confirmed the effectiveness of strontium-89 for palliative treatment in patients with multiple bone metastases

The bone-seeking radiopharmaceutical Sr-89 has been used in the palliative treatment of patients with bone pain caused by bone metastases. Sr-89 is a suitable isotope because it is a pure beta emitter. We obtained Sr-89 images with bremsstrahlung in patients 1 week after injection. The imaging of Sr-89 had not been previously reported. We participated in a multicenter trial to confirm the effectiveness of Sr-89 in combination with zoledronic acid and other anticancer agents.

8. Investigation of the physical properties of microcatheters smaller than 2.2 Fr

Various types of medical equipment are used for interventional radiology, and microcatheters are required to reach narrow, distal vessels for such techniques as transcatheter arterial embolization. We have previously reported the physical properties of an advanced microcatheter. The physical properties of microcatheters with tip diameters of 1.8 to 2.2 Fr were reviewed. We measured tip hardness, the smoothness of the interior and exterior surfaces, the flow rate, flexibility of the guide wire, the ability to maintain shape, resistance to kinking, visibility, intensity of pulling, and pressure resistance. The apical flexibility of the catheters was good, but flow rate, visibility, and pressure resistance were problematic.

The division of radiation therapy

1. The efficacy of re-irradiation after systemic treatment for recurrent disease

For patients with recurrence or metastatic lesions after radiotherapy, the efficacy of re-irradiation over the tolerance dose of normal tissues was examined. In 50% of patients, re-irradiation was successful for palliative therapy and maintained quality of life.

2. Relationship of bronchiolitis obliterans with organizing pneumonia syndrome and hormonal therapy after breast-conserving therapy

We examined the relationship of bronchiolitis obliterans with organizing pneumonia syndrome and factors in complications during systemic therapy after breast-conserving therapy. The incidence of bronchiolitis obliterans with organizing pneumonia syndrome in our hospital was 2.3%. Our findings suggest that patient age and the starting time of hormonal therapy are correlated with the risk of complications.

3. Randomized controlled trial of a trimodality protocol for high-risk prostate cancer

Many investigators have recently used a trimodality protocol (high dose rate prostate brachytherapy, external beam radiotherapy, and hormonal therapy) to treat high-risk prostate cancer. The optimal duration of hormonal therapy combined with radiotherapy has remained controversial. We are planning a randomized trial to determine the

optimal duration of hormonal therapy in a trimodality protocol for high-risk prostate cancer. The duration of neoadjuvant hormonal therapy is 6 months. Two arms will include adjuvant hormonal therapy for 6 months or for 2 years. We plan to start this randomized controlled trial in 2010.

4. Radiation therapy for primary orbital mucosa-associated lymphoid tissue lymphoma
From 2000 through 2007, 13 patients (8 men and 5 women; age range, 27 to 77 years; median age, 53 years) with orbital mucosa-associated lymphoid tissue lymphoma were treated with radiotherapy alone (total dose, 30 to 38 Gy; median dose, 31.6 Gy). Complete remission was obtained in 11 patients, and partial remission was achieved in 2 patients. Local control was achieved in all patients. Cataract surgery was required for 4 patients who received radiation without lens block. Radiotherapy was a safe and effective treatment.

Publications

Ogi S, Gotoh E, Uchiyama M, Fukuda K, Ura-shima T, Fukumitsu N. Influence of hilar deposition in the evaluation of the alveolar epithelial

permeability on ^{99m}Tc-DTPA aerosol inhaled scintigraphy. *Jpn J Radiol* 2009; **27**: 20-4.