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Research Activities

Division of diagnostic imaging

1. A computed tomography scoring system as a predictor of neck metastasis in patients with head and neck cancer

Nodal metastasis is the most important prognostic factor in patients with head and neck cancers. We proposed a computed tomography (CT) scoring system that consists of size, shape, extracapsular spread, and focal defects of lymph nodes. Its clinical applicability was assessed by comparison with surgical specimens of neck dissection.

2. CT of eosinophilic chronic rhinosinusitis

Eosinophilic chronic rhinosinusitis is a newly recognized subtype of chronic rhinosinusitis, which is characterized by peripheral blood eosinophilia and massive infiltration of eosinophils in the nasal mucosa. We proposed CT diagnostic criteria for eosinophilic chronic rhinosinusitis and analyzed their clinical usefulness.

3. CT anatomy of the chorda tympani nerve

The chorda tympani should be identified during the temporal bone surgery with the facial recess approach. We evaluated the normal CT anatomy of the chorda tympani and assessed the clinical significance of preoperative identification of the nerve.

4. Magnetic resonance imaging of ovarian mucinous tumors: Comparison of diagnostic accuracy and intraoperative frozen sections

We compared the diagnostic accuracy of magnetic resonance imaging (MRI) of ovarian mucinous tumors with accuracy of intraoperative frozen sections and explored the role of MRI. Ovarian mucinous tumors tend to be underdiagnosed with intraoperative frozen sections. In contrast, MRI is more capable of suggesting the possibility of borderline and malignant mucinous tumors than are intraoperative frozen sections.

5. Comparison between MRI findings of ovarian serous borderline tumors and ovarian clear cell carcinomas: Mimics on MRI

We retrospectively compared the MRI findings of ovarian serous borderline tumors (SBTs) with those of ovarian clear cell carcinomas (CCCs). A cystic tumor with solid/papillary components is the major imaging appearance for both SBTs and CCCs. Papillary components are seen more frequently in SBTs than in CCCs, and a papillary architecture with internal branching on T2-weighted images is more specific for SBTs. The apparent diffusion coefficient values of solid portions tend to be lower in CCCs than in SBTs. We conclude that MRI can be used to differentiate SBTs from CCCs.

6. Assessing clinical probability of deep venous thrombosis using the new classing system
Contrast-enhanced CT is usually performed to screen for deep venous thrombosis (DVT). If the clinical probability of DVT can be predicted before CT, unnecessary examinations might be avoided. To assess the clinical probability of DVT, we made a new scoring classing based on the clinical data of gynecology patients. We used a machine learning method with a neural network. We evaluated the diagnostic accuracy of the system on the basis of actual clinical outcomes.

This study was performed in collaboration with the Department of Obstetrics and Gynecology.

7. Imaging findings of pulmonary infarction

The clinical symptoms of acute or subacute pulmonary infarction are sometimes atypical, and chest CT might be key for the correct diagnosis. Therefore, understanding the characteristic CT findings and sequential CT changes of pulmonary infarction is important. We reviewed the chest CT images and their sequential changes from 10 patients to clarify useful findings in cases of acute or subacute pulmonary infarction.

8. Chest CT findings of a syndrome positive for antigens against aminoacyl-transfer RNA synthetase

Antigens against aminoacyl-transfer RNA synthetase (ARS) are often positive in patients with polymyositis/dermatomyositis and might involve the lungs. To identify characteristic CT features, we reviewed 22 cases of pulmonary manifestation in patients with anti-ARS antigens from our archives from April 2007 through March 2014.

9. MRI evaluation of the therapeutic effects of biological agents in psoriatic arthropathy

Both before and after the start of treatment in patients with psoriatic arthropathy, MR was performed and the presence or absence of enthesitis, synovitis, bone marrow edema, and bone erosion was evaluated. In patients with active psoriatic arthropathy the contrast-enhancement effect was present in enthesitis and synovitis. These contrast-enhancement effects disappeared where good therapeutic effects were obtained. Contrast-enhanced MRI is useful for evaluating therapeutic effects in patients with psoriatic arthropathy.

10. Evaluation of frequency of high signal intensity on MRI at the iliacus muscle origin into the iliac fossa

High signal intensity at the iliacus muscle origin entheses was present in 131 examinations (23.6%) and in 93% of patients older than 80 years. Pathology at the iliacus muscle origin may be an overlooked cause of groin pain and may be associated with development of pathology.

Division of Ultrasound

1. Power Doppler ultrasonography for evaluating the activity of rheumatoid arthritis

Power Doppler ultrasonography was performed in the bilateral wrists, elbows, shoulders, knees, and ankles of patients with rheumatoid arthritis. The synovial blood flow signals were scored with a 3-grade scale, and the total score in the 10 joints was regarded as the total signal score. The total signal score was strongly correlated with serum levels of vascular endothelial growth factor, angiopoietin 1, and angiopoietin 2.

Division of Nuclear Medicine

1. Physiological change of accumulation in I-123 iomazenil brain single-photon emission CT during childhood

Physiological regional accumulation of I-123 iomazenil brain single-photon emission CT (SPECT) changes markedly during childhood, especially before the age of 3 years. The aim of this study was to compare regional accumulation in the brain on anatomically standardized I-123 iomazenil brain SPECT images, which were obtained with the 3-dimensional stereotaxic region of interest template, a fully automated software program. A total of 172 patients aged 1 month to 15 years with convulsive disease were examined with iomazenil SPECT in cooperation with Saitama Children's Medical Center; no significant abnormalities were found. We assessed regional accumulation to leverage regional corrected counts/pixel (regional mean counts/pixel/dose administered/patient body surface area) corrected by the time between the measurement of dose and the scan.

In neonates, physiological accumulation was low throughout the brain and was lowest in the frontal lobe, in accordance with cerebral blood flow. As infants aged, accumulation increased in all regions, especially in the occipital lobe and, to a lesser extent, in the cerebellum. The peak iomazenil uptake was in the cerebrum in patients aged 4 to 6 months and in the cerebellum in patients aged 7 to 9 months. The rate of change in physiological accumulation was lowest in the frontal lobe. Decreasing iomazenil uptake in the cerebrum and cerebellum is believed to be related to synapse elimination in the developing cerebrum and cerebellum.

Division of Interventional Radiology

1. Comparing the amount of procedural time and total hemorrhage between temporary balloon occlusion of the common iliac artery and the internal iliac artery during cesarean delivery among patients with placenta previa and placenta accreta

Temporary internal iliac arterial balloon occlusion was previously chosen for cesarean delivery with placenta previa or accreta to prevent massive hemorrhage at The Jikei University Hospital, but the amount of hemorrhage was not satisfactorily controlled because of collateral arterial flow.

Therefore, we have changed to temporary occlusion of the common iliac arterial and compared the amount of procedural time and hemorrhage.

We found no significant difference in the amount of hemorrhage. This result may be due to the small number of cases and to the amount of total hemorrhage differing greatly among cases.

The procedure time for balloon placement differed significantly ($P < 0.05$) between the internal iliac artery and the common iliac artery, and anatomical complexity may affect this difference.

No complications occurred in our series, and the common iliac artery occlusion procedure can be more useful in emergency situations because of the short time of balloon placement and may reduce the amounts of radiation exposure and contrast material.

2. Retrospective investigation of percutaneous cryoablation for stage T1b renal cell carcinomas

We investigated clinical outcomes and renal function outcomes of percutaneous cryoabla-

tion performed for stage T1b renal cell carcinomas from September 1, 2011, to July 31, 2014.

3. Percutaneous cryoablation for breast cancer

The inclusion criteria for percutaneous cryoablation for breast cancer are a maximum tumor diameter of less than 1.5 cm, luminal A-like pathological findings of core needle biopsy, the exclusion of ductal invasion with imaging, and the negativity of sentinel lymph node biopsy. We investigated local control and cosmetic outcomes.

4. Efficacy of transcatheter arterial embolization before percutaneous cryoablation for endophytic renal cell carcinomas

We believe that transcatheter arterial embolization provides clear visualization of endophytic renal cell carcinomas during CT-guided procedures. We reviewed the local control, periprocedural complication, and postoperative renal function of patients who had undergone transcatheter arterial embolization before percutaneous cryoablation.

Division of Radiation Therapy

1. Kochi Oxydol-Radiation Therapy for Unresectable Carcinomas (KORTUC) is enzyme-targeting radiosensitization treatment which uses a radiosensitizer, contains hydrogen peroxide at a low concentration, and inactivates peroxidase/catarase in the tumor tissue. Most malignant tumors contain many hypoxic cancer cells and/or large amounts of antioxidative enzymes and are, therefore, resistant to low linear energy transfer radiation. In KORTUC I the superficially exposed tumor is covered with gauze soaked with a hydrogen peroxide solution. In KORTUC II the radiosensitizer is injected into the tumor. A total of 17 patients with locally advanced malignant neoplasms have entered our clinical trial and been treated with KORTUC I or II.

2. Radical radiotherapy for prostate cancer

Prostate cancer has various treatment options. In radiotherapy for prostate cancer, progress has recently been made in ultrahypofractionation. Stereotactic body radiotherapy (SBRT) has attracted considerable attention by allowing the clinical use of ultrahypofractionation. The use of SBRT and intensity-modulated radiotherapy for treating lung cancer has proceeded in our department. We also plan to use SBRT and intensity-modulated radiotherapy to treat prostate cancer.

3. Clinical outcomes of current chemoradiotherapy for esophageal cancer refractory to docetaxel, cisplatin, and fluorouracil

The combination of docetaxel, cisplatin, and fluorouracil (DCF) is a candidate regimen for induction chemotherapy for esophageal cancer, due to its high efficacy. Therefore, the treatment of DCF-refractory tumors is extremely difficult. We evaluated overall survival and the efficacy of locoregional control after concurrent chemoradiotherapy with fluorouracil and cisplatin for DCF-refractory esophageal cancer.

Publications

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Yonenaga T, Saeki H, Nakagawa H, Fukuchi O, Umezawa Y, Hayashi M, Ito T, Yanaba K, Tojyo S, Fukuda K. Four cases of Japanese patients with psoriatic arthritis in whom effective treatments by anti-tumor necrosis factor- α drugs were evaluated by magnetic resonance imaging together with improvement of skin lesions. *J Dermatol.* 2015; **42**: 49-55.

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Reviews and Books

Ojiri H. Diagnostic imaging of the esophageal cancer. In: Ando N, editor. Esophageal squamous cell carcinoma: diagnosis and treatment. Tokyo: Springer Japan; 2014. p. 33-61.