

The Physics of Radiofrequency Ablation vs Cryoablation for Renal Cell Carcinoma.

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Cryoablative technology and radiofrequency ablative technology are both used for percutaneous image guided renal cell carcinoma ablation. The physics of these procedures determines which is better suited for achieving complete tumor necrosis. Review of the current literature regarding the results of using radiofrequency ablation for renal cell carcinoma is compared with this institution's 5-year experience with cryoablation of renal cell carcinoma under MRI guidance. Treatment success rates, tumor site, tumor location, complication rates, and recurrent or residual disease are all evaluated in an effort to distinguish which of these methods is more effective for the treatment of renal cell carcinoma with minimally invasive image guided thermal ablative technologies. Additionally, an explanation of the physics of both thermal ablative technologies at the cellular level is included in an effort to provide an understanding of the abilities and limitations of these technologies in the treatment of this disease process. Review of the literature suggests that both technologies are suitable for treating a subset of renal cell carcinomas: exophytic tumors less than 3 cm in size. However, as the tumor size increases above 3 cm and as the tumor location moves centrally, treatment success rate with a single therapy intervention and multiple therapeutic interventions is greater with cryoablation when compared to radiofrequency ablation. Additionally, the image-guided superiority of MRI plays a role in the treatment success rate when compared to ultrasound or CT guided radiofrequency ablation of renal cell carcinoma. Cryoablation for renal cell carcinoma is better than radiofrequency ablation for achieving complete tumor necrosis. MRI for image guidance increases the success rate and decreases the complications.

Positron Emission Tomography in Laryngeal Cancer.

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In previous studies, positive electron tomography (PET) measuring uptake of 18F-fluoro-2-deoxyglucose has differentiated between benign and malignant lesions using standardized uptake values (SUV), lesion-to-normal liver background ratio of radioactivity, or glucose quantification. Areas with high rates of glucose utilization have increased uptake. Accuracy to differentiate benign and malignant lung lesions is reportedly 87–94% and for laryngeal lesions 82–88%. A 61-yo male presented with complaints of alopecia and 25-lb weight loss over the last year. Labs revealed polycythemia, hemoglobin 17.8 and hematocrit 52.8. Chest x-ray showed a left upper lobe lesion. CT confirmed left lung lesion measuring (4.5 × 6 cm) and a right upper lobe lesion measuring (2.5 × 4 cm). Lung cancer was suspected because of the history of smoking. An ear, nose, and throat test revealed a fixed mass over the right true vocal cord. Subsequent biopsies of the laryngeal lesion were positive for invasive squamous cell carcinoma. Whole body PET scan revealed multiple areas of increased uptake in the left lung, right apex and inferior laryngeal region consistent with malignancy. At diagnosis, the laryngeal lesion had a maximum SUV of 20 (mean, 8), while the index lung lesion had a maximum SUV of 10 (mean, 4). CT guided biopsy of an index lung lesion stained positive for acid fast bacilli with caseating granulomas, which was diagnosed *Mycobacterium avium intracellulare* (MAI) complex. Treatment for MAI included clarithromycin, ethambutol, and rifampin and for laryngeal cancer

cisplatin and radiotherapy. A PET scan 5 months after treatment ended showed the laryngeal lesion had minimal uptake and normal SUVs, while the index lung lesion had a maximum SUV of 11 (mean, 5). PET imaging has limitations in differentiating acute infectious processes and malignancies, despite the belief that PET scans are accurate. Biopsies are important to diagnose the underlying process causing increased glucose metabolism.

Radiological, Clinical, and Pathological Findings in Pseudosubarachnoid Hemorrhage.

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A pseudo-subarachnoid hemorrhage is a false positive finding on CT head examination. The scan appears positive for a subarachnoid hemorrhage. This is not substantiated by subsequent neuropathologic findings. We describe three patients with anoxic encephalopathy that appear to have diffuse subarachnoid hemorrhage on CT examination. Autopsy photographs provide pathological correlation. Review of the medical literature includes six additional reports of this phenomenon. None of these patients had subarachnoid hemorrhage. CT scans of normal patients show the cranial bone lined by a thin layer of dura mater. This overlies the subarachnoid space filled with cerebrospinal fluid (CSF). The average width of this space varies, increasing with age. With brain swelling due to acute hypoxic encephalopathy, the cerebral cortex becomes displaced into areas normally occupied by CSF and veins become congested. The increased average tissue density immediately deep to the dura and superficially within the cerebral sulci results in hyperdensity on unenhanced CT, simulating the appearance of subarachnoid hemorrhage. On CT examination, a patient with hypoxic ischemic encephalopathy can show increased density in the subarachnoid space. This can be erroneously interpreted as subarachnoid hemorrhage. Our experience and a review of the literature suggest that this condition is not rare and is being misdiagnosed with some regularity. Radiologists, neurologists, and neurosurgeons should avoid this pitfall.

Percutaneous MRI Guided Cryoablation of Painful Skeletal Metastasis.

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Our purpose is to detail the results of our experience with percutaneous MRI guided cryoablation of painful bone metastasis with regard to pain relief. Thirty-two patients with 46 individual tumors underwent MRI guided percutaneous cryoablation to provide palliative care for their painful bone metastasis. Most patients were suffering from significant pain requiring large doses of narcotics and some patients were selected to prevent further bony destruction. All patients were treated as in-patients in an IRB approved clinical trial. Each patient was followed closely using MRI and CT imaging. Data regarding complications and the need for re-treatment were correlated with tumor size, location, and clinical outcomes from prior treatments. The source of the metastasis included breast cancer, renal cell carcinoma, colon cancer, and lung cancer. Two patients had primary benign bone tumor (osteoid osteoma) and one patient had a metastatic pulmonary carcinoid tumor to the body of the second cervical vertebrae. The vast majority of the patients achieved significant post-operative pain relief in the immediate post-operative period. One patient treated for neuropathic pain along the third through eighth ribs experienced only temporary relief. After approximately 24 hours, his pain returned. Tumor locations included le-

sions in the appendicular and axial skeleton. The most painful were those destroying the vertebral body, usually metastatic renal cell carcinoma. Several unusual sites of metastasis that would normally require difficult surgical resection and a high level of morbidity and mortality were treated successfully with this minimally invasive method. Percutaneous MRI guided cryoablation of painful skeletal metastasis demonstrated significant and nearly complete pain relief with long lasting results, low morbidity, and zero mortality. The ability to provide immediate and sustained pain relief is a significant advantage over comparative treatments such as external beam radiation.

Physiological Localization of F-18 Fluoro-deoxyglucose (FDG): A Potential Source of False-positive FDG Scans for Cancer.

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Positron emission tomography (PET) using F-18 fluoro-deoxyglucose (FDG) has become a very powerful tool for staging and re-staging several cancers. The purpose of this study was to identify physiological patterns of normal small and large bowel uptake of F-18 FDG that may be confused with cancer. The study population included 51 patients (pt) with neoplasms. There were 17 males and 34 females with mean age of 57 ± 16 years. The images were analyzed to identify the location and the intensity of bowel uptake (BU). The uptake was graded as follows: 1+ is BU liver uptake. The small bowel uptake was graded as focal or diffuse depending upon the extent of the uptake. The extent of large bowel uptake was graded as limited (1 to 2 quadrants) or extended (3 or more quadrants). Small bowel uptake was seen in 27 (53%) pts with most (22/27) pts exhibiting 1+ diffuse uptake. Focal small bowel uptake of intensity equal or more than liver was seen in 5 of 27 pts. Large bowel uptake was noted in 32 pts with limited pattern in 13 and extended pattern in 19 pts. Large bowel uptake of intensity equal or more than liver was seen in 10 pts, with 1+ activity in 22 pts. Complete absence of bowel uptake was noted in 6 of 51 pts. Large or small bowel uptake is a common finding on whole body PET scan. The uptake may be diffuse or focal and vary with location and intensity. High intensity uptake (3+) sufficient to result in potential false-positive interpretation was present in about one in six studies. Knowledge of physiological patterns of bowel uptake may help in preventing false-positive interpretations of PET scans.

Radiofrequency Ablation of Stage I and II Primary NSCLC.

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Only 30–50% of patients with non small cell lung cancers (NSCLC) present with stage I and II disease. It is these patients who are candidates for surgical resection for cure, without adjuvant therapy. These patients can achieve a 5-year survival of 60–70% and 39–43%, respectively, following surgical resection of their tumors. However, many patients suffer from severe medical co-morbidities and are not candidates for a surgical resection. These patients are usually treated with definitive local radiation and can achieve survival of only 15–35%. All patients underwent percutaneous radiofrequency ablation (RFA) under CT guidance. Of these stage I and II patients, 5 (38%) had died at up to 49 months following RFA, but only 2 of the 5 died due to disease progression. Based upon a Kaplan-Meier method analysis of 13 patients treated with stage I and

II disease, our best estimate is that a patient has 76% chance of surviving 27 months. Due to our small sample size and length of follow-up (48 months), our 95% confidence interval ranged from 100 to 47%. This put our worst-case survival of 47% well within the range of published data from curative resection (67% and 47%, respectively for stages I and II). Most notably, this figure is significantly better than the 15–35% 5-year survival achieved with definitive radiotherapy for these same patients without the benefit of RFA. RFA may be capable of achieving survival comparable to surgical resection in stage I and II lung cancers, when combined with standard alternative therapy.

Conversion of 35 mm Text Slides into PowerPoint Using Direct Optical Character Recognition Technology.

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Electronic presentations are now the preferred method of presenting information at national and regional radiological meetings. Many radiologists have large collections of lectures based on 35 mm slides. Conversion of radiographs and photographs to electronic images is straightforward and can be done by direct photography, photography of projected images, or scanning with a dedicated 35mm device or a flatbed scanner. Conversion of electronic images of text slides to PowerPoint requires an extra step for best results: An optical character recognition program is used to convert the pictures of the words into code that can be recognized by computer word processing programs, including PowerPoint. Text slides are of first generation quality, without artifacts or copy degradation. Text can be changed, revised, updated, and corrected. Using this method, the full features of PowerPoint can be used to create solid, compelling programs.

Section on Rheumatology

Hypothenar Hammer Syndrome Masquerading as Raynaud's Syndrome: Case Report and Literature Review.

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A 48-year-old male was referred to Rheumatology clinic with diagnosis of Raynaud's syndrome from his primary care physician. He complained of pain and decreased temperature in the right 4th finger. There was no pain or decreased temperature in any of the other fingers. No symptoms of connective tissue disease. On examination, he had good radial, ulnar, and brachial pulses bilaterally. The right 4th finger was cool and pale. The rest of the physical examination was unremarkable, specifically no stigmata of connective tissue disease. Outside lab tests were normal including a negative ANA and a normal sedimentation rate. Angiography was done and showed dissipated ulnar artery flow beyond the level of the right wrist compatible with Hypothenar Hammer Syndrome. Patient's occupation involved removing and replacing hubcaps on automobile tires, and he frequently used the palm of his right hand as a hammer instead of the usual rubber mallet. A literature review is presented. The lesson of this case is that a male who presents with a unilateral, cold finger needs a detailed occupational history that should include specific questioning on the use of the affected hand as a tool. Hypothenar Hammer Syndrome is probably more likely than Raynaud's in this clinical setting.