2058 POSTER

Interval between diagnosis of advanced cancer and cessation of active anti-cancer treatment can predict survival in terminally ill cancer patients

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Background: Although various prognostic factors have been proposed to predict survival in terminally ill cancer patients, accurate prognostication is still a challenging task for oncologists. The objective of this study was to evaluate whether the time interval between diagnosis of advanced cancer and cessation of active anti-cancer treatment (ATP; active treatment period) can predict survival in terminally ill cancer patients.
Methods: We prospectively evaluated 79 patients with advanced (recurrent or metastatic) cancer who were determined as terminal stage, namely cessation of active anti-cancer treatment and transition to palliative care, by attending oncologists. ATP and other known prognostic factors including clinical symptoms and signs, performance status, laboratory tests, and clinical prediction of survival (CPS) were analyzed.
Results: Of the 79 patients, 46 were male (58%) and 33 were female (42%) with a median age of 60 years (range, 21–82). Median overall survival after being diagnosed with advanced cancer was 11.6 months (95% confidence interval (CI), 8.02–15.18), and survival after being determined as terminal stage was 1.9 months (95% CI, 1.38–2.42). According to 3 ATP categories (<3 months, 3–12 months, and >12 months), terminal stage survival were 1.0 month, 1.8 months, and 3.6 months, respectively ($p = 0.002$). On multivariate analysis, short ATP, non-colorectal cancer, fatigue, and Karnofsky performance status less than 50 were significantly associated with a poor prognosis.
Conclusion: Our study suggests that ATP is an independent prognostic factor for survival in terminally ill cancer patients who cannot receive active anti-cancer treatment anymore. Future prognostic models should include ATP as a prognostic variable.

Imaging

Poster presentations (Thu, 24 Sep, 09:00−12:00) **Imaging**

2100 POSTER

The role of 18F-FDG PET in detection of biliary tract cancer recurrence during surveillance: A single center observational study

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Background: Although recent improvements in diagnostic imaging, the detection and decision of recurrence of biliary tract cancer remain difficult until the tumor has grown to a considerable size. The goal of this study is to evaluate the clinical role of ^{18}F-FDG Positron Emission Tomography (^{18}F-FDG PET) in the assessment of disease recurrence after curative surgery in biliary tract cancer.
Patients and Methods: We consecutively enrolled biliary tract cancer patients, who checked PET for the suspicion of recurrence based on contrast computed tomography (CT) during surveillance after curative surgery from January 2000 to June 2008 in Seoul National University Hospital. The final diagnosis of recurrence was determined by a tissue confirmation or a change of lesions by the followed-up contrast CT after 3months. McNemar's test and Fisher's exact test were used to evaluate sensitivity and specificity of PET and contrast CT.
Results: A total of 50 patients were enrolled. Pathologic diagnosis was done in 9 patients and the others were evaluated with follow-up CT for the recurrence. Of these, 34 patients (68%) were confirmed as recurrence. The sensitivity was 88% (30/34) for PET and 76% (26/34) for CT (p = 0.16). The specificity was 69% (11/16) for PET and 44% (7/16) for CT (p = 0.10). The positive predictive value (86% vs 74%, p = 0.72) and negative predictive value (73% vs 47%, p = 0.55) was not different between PET and CT. Additional PET on contrast CT significantly increased the sensitivity of detection for recurrence than contrast CT alone (94% (32/34) in PET+CT vs 76% (26/34) in CT, p = 0.03) without increasing of specificity (38% vs 44%, p = 1.00), positive predictive value (76% vs 74%, P = 1.00) and negative predictive value (75% vs 47%, p = 0.72).
Conclusions: PET was as sensitive and specific as contrast CT in detection of recurred biliary tract cancer. Additional PET on contrast CT significantly increased the sensitivity compared to contrast CT alone, but the specificity, positive and negative predictive value were not improved. Further studies are warranted to validate the role of PET in detection of biliary tract cancer recurrence.

2101 POSTER

Evaluation of neoadjuvant chemotherapy with FDG PET/CT and MRI in adult patients with Ewing's sarcoma (ES) and osteosarcoma (OS): beyond RECIST

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Background: In ES and OS, prognosis drops dramatically if the histopathological response to neoadjuvant chemotherapy is limited. Early, adequate therapy evaluation prevents prolonged exposure to toxic yet ultimately unsuccessful treatment, which in some cases may be substituted by a more effective alternative. Because of distinct biological features of bone sarcomas traditional RECIST criteria probably do not represent tumor viability. Therefore, the aim of this analysis was to investigate whether next to standard volumetric criteria, necrosis measurement with MRI and activity evaluation with FDG PET/CT correlated with histopathological response after neoadjuvant chemotherapy.
Patients and Methods: Since October 2007 adult patients diagnosed with OS or ES at the Radboud University Nijmegen Medical Center were referred for both MRI and PET/CT imaging. Whole-body FDG-PET/CT and MRI of the affected site were performed at baseline and after neoadjuvant chemotherapy. For MRI tumor size changes and the amount of tumor necrosis defined as the proportion of areas with increased signal on T2-weighted contrast-enhanced images with fat saturation and decreased signal on T1-weigted images after neoadjuvant chemotherapy were assessed. For FDG-PET/CT the percentual decrease of maximum standardized uptake value (SUV_{max}, representing the most active parts of the tumor) after neoadjuvant chemotherapy as compared to baseline was calculated and the results were categorized according to the EORTC criteria for PET-response. All data were tested for correlation with response to chemotherapy as assessed by histopathology in resected tumors.
Results: To date, evaluable results of 12 patients (58% male, 58% OS, median age at diagnosis 19.5 years) are available. Tumor size changes were not correlated with necrosis in the resection material (Spearman rho 0.11, p 0.79), neither was the amount of necrosis as estimated by MRI (rho 0.16, p 0.70). In contrast, the percentual decrease of SUV_{max} and histopathological necrosis were strongly correlated (rho −0.81, p 0.027). However, subsequent categorization according to the EORTC PET-criteria was not significant (rho −0.40, p 0.375), indicating that the EORTC thresholds for PET response do not apply for OS and ES.
Conclusion: The percentual decrease of SUV_{max} strongly correlates with histopathological response to neoadjuvant chemotherapy. It is therefore a promising tool for early decision making in the management of ES and OS in future protocols.

2102 POSTER

PET-CT can reliably determine the tumour dimensions of rectal cancer

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Background: PET-imaging has proven to be a useful tool in radiotherapy treatment planning as well as in response evaluation. However, for rectal

cancer the role of PET-CT imaging has not been well established yet. In order to further explore the use of PET for rectal cancer in radiotherapy, it is important to determine whether PET-imaging adequately visualizes the tumour volume. Therefore, we correlated the tumor dimensions as measured on the pathology specimen with three pre-surgical diagnostic tools, namely PET based automatic tumour delineation, MR imaging and endoscopy.
Materials and Methods: Nineteen patients with rectal cancer, who underwent both MR and PET-CT imaging, followed by short-course radiotherapy (RT; 5×5 Gy) and surgery within 3 days after RT, were included. Tumor contours were automatically created based on the PET-images using the signal-to-background-ratio method. The independently measured tumor length on pathology was compared with the automatic PET-CT based measurements and the independent-investigator-based MRI and endoscopy measurements.
Results: PET based measurements strongly correlated with pathology reaching a Pearson correlation of 0.91 ($p < 0.001$). In contrast, MR-based measurements correlated less strongly, but still significantly (Pearson correlation = 0.75; $p < 0.001$), whereas endoscopy-based measurements did not reach significance at all (Pearson correlation = 0.34; $p < 0.18$). These findings were alsow confirmed on Bland-Altman and intraclass analysis.
Conclusion: Automatically generated PET based tumour contours provide a very useful tool to accurately non-invasively determine the largest cranio-caudal tumor dimension in rectal cancer. Thus, PET based automatic measurements provide an excellent tool to accurately determine the target in radiotherapy and response evaluation.

2103 POSTER

Accuracy of integrated PET-CT for mediastinal lymph node metastases in non-small cell lung cancer

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Background: [18F] Fluorodeoxyglucose Positron Emission tomography (FDG-PET) and Computed Tomography (CT) are routinely performed in the workup study of non-small cell lung cancer (NSCLC) to exclude distant metastases. The Institute for Clinical and Evaluative Sciences (ICES) report also concluded that PET is more efficacious than CT in identifying mediastinal involvement. The purpose of our study is to estimate the diagnostic accuracy of integrated PET-CT in mediastinal staging of NSCLC.
Methods: A retrospective study was performed comparing PET-CT and CT with pathological assessment of the mediastinum in 38 patients with potentially resectable NSCLC. To assess the agreement between PET-CT, CT and pathological results a Cohen's kappa coefficient was calculated.
Results: Sensitivity and specificity were 0.50 (95%CI 0.25−0.75) and 0.86 (95%CI 0.64−0.96) for integrated PET-CT; 0.47 (95%CI 0.22−0.73) and 0.79 (95%CI 0.54−0.93) for CT alone. Overall the diagnostic accuracy for PET-CT and CT were 0.71 (95%CI 0.55−0.84) and 0.65 (95%CI 0.49−0.80) respectively ($p > 0.05$). There was a low correlation between mediastinal staging with PET-CT or CT and pathological results (PET-CT vs. Histology Kappa = 0.38 and CT vs. Histology Kappa = 0.264).
Conclusion: In our study integrated PET-CT did not provide a significant advantage over CT alone to assess mediastinal lymph node metastases. Mediastinoscopy is still mandatory to determine mediastinal status.

2104 POSTER

The role of FDG PET (CT) for diagnosis of peritoneal carcinomatosis of colorectal origin

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Introduction: Since the early 1990 s, in patients with peritoneal carcinomatosis (PC), a regional treatment associating a cytoreductive surgery (CS) with a hyperthermic intraperitoneal chemotherapy (HIPEC) is used to treat some patients with a curative intent. This aggressive treatment requires the most precise evaluation of the disease in the peritoneum to evaluate disease extension and eventually therapeutic response aiming to better select patients for surgery. Nevertheless, the evaluation of the PC by conventional imaging (computed tomography) remains difficult.
The aim of the study is to evaluate the diagnostic performance of FDG-PET (CT) in the diagnosis of PC of colorectal origin, and the correlation between the most metabolically active lesions (and/or the most extensive) on the preoperative FDG-PET (CT) and the most involved abdominal region assessed intra-operatively using the Peritoneal Cancer Index (PCI).
Materials and Methods: Retrospective research of the Bordet PET (CT) database was performed to select 52 colorectal cancer patients: 26 patients with PC operated on for explorative surgery with intraoperative biopsy who have been submitted to a preoperative 18-FDG-PET (CT), and a reference group of 26 patients without PC (no peritoneal carcinomatosis at surgery or a favourable clinic at one year follow-up). FDG-PET (CT) images were blindly re-assessed by 2 experienced nuclear medicine physicians, in consensus. A pre-established patient-based and a 9 quadrant-based classification was used to classify the presence and relative intensity of PC. The highest quadrant score of FDG-PET (CT) was compared to the highest quadrant score of the PCI.
Results: FDG-PET (CT) correctly identified the presence of PC in 22 patients out of 26. There were 3 false positive and 3 false negative PET (CT) scorings. The patient-based sensitivity and specificity of PET (CT) were respectively 85% (22/26) and 88% (23/26). The negative predictive value was 85% (23/27); the positive predictive value was 88% (22/25) and the accuracy was 87% (45/52).
The highest FDG PET (CT) quadrant score correlated with de highest PCI quadrant score in 77.3% of the patients.
Conclusion: PET (CT) is an accurate method for detecting peritoneal carcinomatosis in patients with colorectal cancer. PET (CT) seems to be a promising imaging modality for treatment response evaluation (good imaging-surgical correlation) before performing CS and HIPEC.

2105 POSTER

Post-neoadjuvant molecular re-staging of rectal cancer: correlations of PET-CT and inmunohistochemical (IHQ) chemoradiation induced changes

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Background: To analyze molecular changes induced by chemoradiation in rectal cancer and correlate histopathological to molecular imaging/profile response findings.
Matherials and Methods: 28 consecutive patients treated with Oxaliplatin and chemoradiation containing neoadjuvant program were prospectively studied with PET-CT and 8 molecular variables determined by IHC (Ki67, p53, cerb-2, Cox-2, EGFR, VEGFR, E-catherina, Beta-catenina). Histopathological response was assessed using the Tumor Regresion Grade (TRG) scale.
Results: Dimensional PET-CT findings of the residual primary lesion ranged from $7.0\times2.8\times57$ mm to $7\times6\times12$ mm (median $15\times18\times16$ mm). SUVmax values ranged from 1.3 to 7.3 (median 2.9). Molecular IHC determinations in the surgical specimen selectively analyzed the areas of residual cancer. Presence of residual cancer related molecular expression were: Ki67 24/28 (1%-90%); Cox-2 16/28 (10%-100%); p53 16/28 (5%-100%); EGFR 5/28 (5%-20%); cerb-2 3/28 (20%-100%); VEGFR 19/28 (20%-100%); E-catherina 17/28 (5%-100%); betacatenina citoplasmic 24/28 (80%-100%); betacatenina nuclear 21/28 (70%-100%). Histopathological classification compatible resistant rectal cancer to chemoradiation ($\leqslant$TRG 2) had significantly superior SUVmax values. Dominant molecular events were observed in Ki67, p53, VEGFR and E-catherina expression. Except for pT_0 patients, there were no identical IHQ profile expression after chemoradiation in the cohort of patients. All SUVmax values over 4.4 were pT_3 or TRG2 specimens categories (5/28).
Conclusions: Molecular assessement of post-neoadjuvant (oxaliplatin containing) induced effects in rectal cancer identifies an heterogeneous pattern of response both in bio-imaging and IHC determinations. Molecular pattern of resistant disease is correlated by PET-CT and downstaging/tumor regression grade scales.

2106 POSTER

Molecular staging of cT3 rectal cancer: PET-CT and inmunohistochemical (IHC) profile correlations

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Background: To analyze prospectively bio-imaging PET-CT findings and multi-molecular expression (Ki67, p53, cerb-2, Cox-2, EGFR, VEGFR,