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PROFESSIONAL PAPER

Value of Positron Emission Tomography/ Computed Tomography (PET-CT) in Suspected Non-small Cell Lung Cancer Recurrence and Impact on Patient Management

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ABSTRACT

Introduction: Positron emission tomography/computed tomography (PET-CT) is very sensitive for diagnosis of recurrent NSCLC and has a significant impact on change of management. Preliminary data suggest superiority of PET-CT comparing to CT alone for lung cancer restaging. **Materials and methods:** This is a retrospective study which aim is to validate usage of PET-CT in suspected non-small cell lung carcinoma recurrence and its impact on further patient management. Total number of 31 patients with non-small cell lung carcinoma and uncertain diagnosis of recurrent disease or its extent after routine clinical and CT work-up were enrolled in this study. **Discussion:** We found in our study that PET-CT diagnosed recurrent disease in 65% of patients who were previously presented with an indeterminante CT. In 85% of patients there were change in further management. **Conclusion:** We suggest that PET should be performed on patients who have suspected relapse after potentially curative treatment, particularly if active treatment is being considered. PET-CT improved the diagnosis of recurrent NSCLC and this resulted in a significant impact and change in further patient management.

Key words: NSCLC, PET-CT, impact, post-treatment, management.

1. INTRODUCTION

When we are discussing the post-treatment management of patients with non-small cell lung carcinoma (NSCLC) it is important to point out that there are different opinions regarding tests used for monitoring of the disease. Controversy exists about diagnostic tests which should be used during surveillance and how often they should be used. The main reason for this is that there is, at the moment, no evidence that earlier treatment of recurrent disease leads to a better effect. Certain scientific societies recommend in their guidelines only physical examination every 3 months (ASCO), and other societies like the American College of Radiology, NCCN and ACCP suggest annual CT scan as stated in their guidelines. Still, there are many questions in the post-treatment period that should be answered, like complication of treatment, disease recurrence, or new primary tumors (1).

There are different studies about PET-CT used for early diagnosis of recurrence, which reports better sensitivity, specificity and accuracy for PET-CT comparing to other tests used during surveillance period. But this diagnostic tool is not yet recommended in guidelines, mostly because of the lack of evidence that earlier diagnosis of recurrence have significant survival benefit. The other important thing is that more intensive monitoring is certainly much more expensive (1).

Follow up of patients with NSCLC is based on early detection of recurrence and also control of complications due to treatment (2-3). Despite curative resection 30% to 55% of patients with NSCLC evolve recurrence and eventually die of their disease (4). Therefore, many patients die of their disease related to recurrence after surgery (5-6).

Very often patients complain of residual symptoms or diagnostic imaging display abnormalities. That precipitate evaluation for residual or recurrent disease. CT is currently the standard diagnostic imaging tool for reevaluation of previously treated NSCLC patients, particularly if symptoms persist or surveillance suggest disease relapse. But computed tomography (CT) based differentiation of necrotic tissue induced

by therapy and residual or recurrent carcinoma is very difficult, sometimes impossible leading to many equivocal CT results. Valid and timely diagnosis of recurrence is extremely significant for initiating therapy sooner and shortening the period of patient anxiety or to avoid unnecessary treatment.

Positron emission tomography/computed tomography (PET-CT) is very sensitive for diagnosis of recurrent NSCLC and has a significant impact on change of management (7). Preliminary data suggest superiority of PET-CT comparing to CT alone for lung cancer restaging (8-9) and a markedly poorer prognosis for patients with positive PET-CT findings than for those with negative PET-CT findings (10).

FDG-PET imaging can depict local recurrence of NSCLC after surgical resection, chemotherapy, or radiotherapy, and this is possible before anatomic changes are visible on conventional imaging (11-14). Some patients with localized relapsed lung cancer may be cured with appropriate aggressive therapy and preliminary data suggest that PET-CT can identify such patients better than other diagnostic methods (15).

2. MATERIALS AND METHODS

Total number of 31 patients with non-small cell lung carcinoma and uncertain diagnosis of recurrent disease or its extent *after routine clinical and CT work-up* in the period of March 2014 to February 2016, were enrolled in this study. Patients were eligible for this study if they had a confirmed histologic diagnosis of NSCLC and had been treated with curative intent 6 months before referral for a PET-CT scan.

This is a retrospective study which aim is to validate usage of PET-CT in suspected non-small cell lung carcinoma recurrence and its impact on further patient management.

All patients had indeterminante CT findings. All of them performed PET-CT study and findings are recorded with confirmation or exclusion of recurrent disease. Patients were classified as negative if imaging showed no abnormality suggestive of recurrence. Positive PET-CT scans were classified as localised relapse or distant disease. We used medical histories from Clinic for Oncology and recorded all changes in patient management after PET-CT study. Treatment intent was categorized by an oncologist experienced in lung cancer management, who synthesized the available pre-PET clinical and imaging information. Any change in patient further management was noted. All interventions and procedures that were supposed to be done before PET-CT study and were canceled after, were recorded.

3. RESULTS

In our study were included 58% males and 42% females. Patients have a hystologycal type of NSCLC as follows: 19 (%) patients had adenocarcinoma, 11 (%) patients were diagnosed as squamocellular carcinoma and 1 (%) had large cell undifferentiated carcinoma (Chart 1).

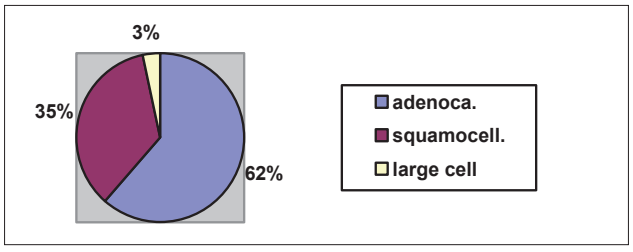

Chart 1.Patient distribution according to hystologycal type of NSCLC

PET-CT analysis found recurrent disease in 20 patients, and 11 patients did not have PET-CT confirmation of recurrence (Table 1).

	PET-CT recurrence	PET-CT No recurrence
	20 (65%)	11 (35%)
Total	31(100%)	

Table 1. Patient distribution according to PET-CT findings

All patients with PET-CT confirmed relapse of disease were classified based on PET-CT findings as locally relapsed or distant disease (Chart 2).

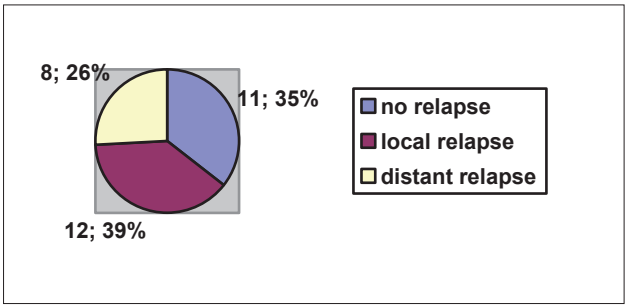

Chart 2. Patient distribution (n=31) according to PET-CT findings of relapsed disease

Medical histories of patients with PET-CT confirmed recurrent disease were analyzed and we found that in 17 (85%) patients there were change in further management. For the rest of 3 patients we did not found any data (Table 2).

IMPACT OF PET-CT ON MANAGEMENT	PET-CT recurrent disease
Change in therapy protocol	8 (40%)
Inclusion in clinical study	1 (5%)
Reinitiation of KT	5 (25%)
Discontinuation of KT	2 (10%)
New medication	1 (5%)
No data	3 (15%)
Total	20 (100%)

Table 2. Patients distribution (n=20) according to PET CT diagnosis of recurrent disease and impact on further management

In the group of patients without diagnosis of recurrent disease there were mostly no any further changes in management (64% of patients). PET-CT findings suggestive for non-recurrent disease show also impact on further management in 4 (36%) patients.

IMPACT OF PET-CT ON MANAGEMENT	PET-CT non-recurrent disease
Change in diagnostic procedure	1 (9%)
Previously planned procedures cacelled	3 (27%)
Previously planned KT canceled	7 (64%)
Total	11 (100%)

Table 3. Patients distribution (n=11) according to PET CT diagnosis of non- recurrent disease and impact on further management

4. DISCUSSION

We found in our study that PET-CT diagnosed recurrent disease in 65% patients who were previously presented with an indeterminante CT. In the study of Bury et all., PET, for the detection of recurrent carcinoma in patients who have been treated with early apparent curative result, has a sensitivity of 100%, a specificity of 97%, a PPV of 93%, an NPV of 100% and a diagnostic accuracy of 98% (95% CI 90±99%). By comparison, the accuracy of CT in this analysis was 91% (95%

CI 81±97%) (15). We could not calculate sensitivity, specificity, PPV and NPV as there were no possibilities to have histology confirmation - gold standard.

Further change in therapy management in our study was observed in 85% of patients with PET-CT confirmed recurrent disease. In a study performed by Hicks et all. published in The Journal of Nuclear Medicine the PET results had a high impact on management in 40 patients (63%) (16).

PET-CT showed no signs of recurrent disease in 35% patients. In this group of patients 36% still have change in further management after exclusion of recurrent disease.

Of potential economic and clinical importance in previously mentioned study by Hicks et all. was the observation that 15 patients (24%) in this group who were suspected to have relapsed by conventional imaging subsequently received no active treatment after a *negative* PET-CT. Only 1 of these patients had relapse confirmed on follow-up. By preventing treatment in these patients, PET is likely to have reduced expenditure but also spared these patients unwarranted toxicity (17, 18).

We found in our study that 64% of patients who were PET-CT negative and had suspicious of relapse on CT, that way consequently avoided planned KT.

5. CONCLUSION

We suggest that PET should be performed on patients who have suspected relapse after potentially curative treatment, particularly if active treatment is being considered. PET-CT improved the diagnosis of recurrent NSCLC and this resulted in a significant impact and change in further patient management.

• Conflict of interest: none declared.

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