FDG PET/CT as a Tool for Early Detection of Bleomycin Induced Pulmonary Toxicity

Hira Shaikh, MD,[1] Zulfa Omer, MD,[1] Roman Jandarov, PhD,[1] Morgan P. McBee, MD,[1] Jennifer Scheler, MD,[1]
Bruce Mahoney MD,[2] Tahir Latif, MD, MBA[1]
University of Cincinnati[1], Medical University of South Carolina[2]

Summary

FDG PET/CT imaging, which is routinely used to assess treatment response in HL, is useful for early detection and guiding interventions for bleomycin pulmonary toxicity (BPT). Hemoglobin and ESR at diagnosis can be predictive of BPT; further studies are needed.

Background

BPT is a serious and potentially fatal complication of bleomycin, a key component of Hodgkin lymphoma (HL) treatment. Beside ours, only one published study evaluated the predictability of FDG-PET/CT in the diagnosis of BPT.

Additionally, we assessed the correlation of clinical BPT with sociodemographic and disease characteristics.

Materials & Methods

In this retrospective study, FDG-PET/CT scans of adult (age >18 years) HL patients treated with ABVD at a single urban academic center, University of Cincinnati Medical Center from 2012-2016 were evaluated for pulmonary toxicity and then assessed for the development of clinical BPT. The images were evaluated by 2 separate radiologists who were blinded to the clinical information. All P-values were two-sided; P<0.05 was considered statistically significant. Data were analyzed using SAS 9.4 software.

Clinical BPT – Univariate analysis

We compared patients with clinical BPT (9/25, 36%) and without clinical BPT (16/25, 64%). Patients in clinical BPT group had lower hemoglobin (mean 10.9 vs 13.3 g/dl, p= 0.037) and higher ESR (mean 63.3 vs 30.2 mm/hr, p=0.0289).

We found that gender, stage, histology, history of lung radiation, prior G-CSF, or steroids did not significantly confer a higher risk of BPT. Patients with bulky disease and prior lung disease had a higher risk of clinical BPT, however, the correlation was not statistically significant.

At diagnosis	Clinical BPT	No Clinical BPT	*P* value
Age, years, mean (SD)	36.11 (15.41)	33.07 (12)	0.6235
Albumin, g/dl, mean (SD)	3.92 (0.51)	3.97 (0.6)	0.8572
Hemoglobin, g/dl, mean (SD)	10.87 (2.34)	13.29 (2.58)	0.0370*
ESR, mm/hr, mean (SD)	63.62 (31.03)	30.18 (27.44)	0.0289*
ALC, /µL, mean (SD)	1042 (556.39)	1449.89 (785.02)	0.1798

Table 1: Clinical BPT by laboratory characteristics: * denotes P<0.05; SD – Standard deviation

		Clinical BPT	No Clinical BPT	*P* value
Bulky disease	**No**	7 (35%)	13 (65%)	0.6791
	Yes	2 (66.67%)	1 (33.33%)	
History of lung disease	**No**	7 (33.33%)	14 (66.67%)	0.2767
	Yes	2 (100%)	0 (0%)	
History of lung radiation	**No**	8 (42.11%)	11 (57.89%)	0.9414
	Yes	1 (25%)	3 (75%)	
Prior G-CSF exposure	**No**	7 (38.89%)	11 (61.11%)	1
	Yes	1 (33.33%)	2 (66.67%)	
Steroid use	**No**	1 (100%)	0 (0%)	-
	Yes	3 (100%)	0 (0%)	

Table 2: Clinical BPT by patient and disease characteristics

FDG-PET/CT and BPT

We found 54 FDG-PET/CT scans from 11 patients who received bleomycin for HL. Five of the eleven (5/11, 45%) patients had radiographic changes characteristically focal or diffuse opacities on PET/CT and developed clinical BPT.

One patient had radiological changes but did not develop clinical BPT, while the other five had no signs of toxicity on imaging. Patients with clinical BPT had higher SUVmax compared to those who did not (mean (CI) - 2.66 (1.8-3.7) vs 0.86 (0.4-1.9), p<0.05, Mann-Whitney U test).

	Negative for clinical toxicity	Positive for clinical toxicity
N	6	5
Age (years)	40.7 ± 15.4	40.6 ± 20.1
Gender (Males/Females)	5/1	3/2

Table 3: Demographics of patients with FDG PET/CT scans evaluated for BPT

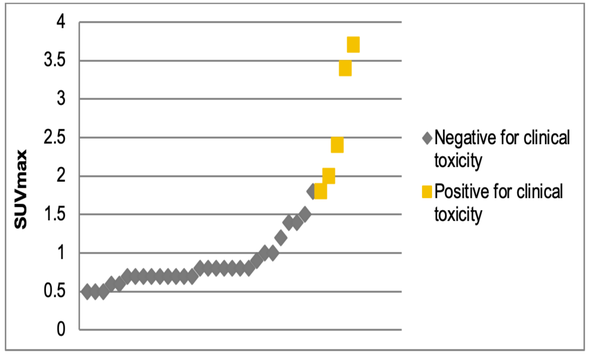


Figure 1: SUVmax of lungs on FDG PET with and without clinical BPT

References

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