Methodological comparison of volumetric analysis on FDG PET in pediatric Hodgkin Lymphoma assessed at different timing

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Introduction

Assessment of response to therapy in pediatric Hodgkin lymphoma (HL) patients by 18F-fluorodeoxyglucose PET/CT (FDG PET) has become a powerful tool for the discrimination of responders from non-responders. The addition of volumetric analyses can be regarded as a valuable help for disease prognostication and biological characterization. Given the multitude of methods available for volumetric analysis in HL, the AIEOP Hodgkin Lymphoma Study Group has designed a prospective evaluation of the Italian cohort of patients enrolled in the EuroNet-PHL-C2 trial.

Methods

The primary objective of the study was to compare the different methods of volumetric assessment in the same HL patients at baseline and during the course of therapy. Overall, 50 patients with 150 scans were investigated for the current study. A dedicated software was used to delineate, semi-automatically, contours of the lesions using different threshold methods. More specifically, four threshold methods were applied: 1) Fixed 41% threshold of the SUVmax within the respective lymphoma site (V41%), 2) Fixed absolute SUV threshold of 2.5 (V2.5); 3) SUVmax(lesion)/SUVmean liver >1.5 (Vliver); 4) Adaptative method (AM). All parameters obtained from the different methods were compared and analyzed with respect to response.

Results

Among the different methods investigated, the strongest correlation was observed between AM and Vliver (rho>0.9; p<0.001 for SUVmean, MTV and TLG at all scan timing), as well as V2.5 and AM or Vliver (rho 0.98, p<0.001 for TLG at baseline; rho>0.9; p<0.001 for SUVmean, MTV and TLG at interim and end-treatment response). Logistic regression demonstrated that MTV and TLG computation according to V2.5 and Vliver significantly correlated to response to treatment (p=0.01 and 0.04 for MTV and 0.03 and 0.04 for TLG, respectively).

Conclusion

The best correlation for volumetric analysis is obtained for AM and Vliver, followed by V2.5. The volumetric analysis obtained from V2.5 and Vliver significantly correlated to response to therapy.