Splenic volume can be a novel predictive parameter for the prognosis of chronic lymphocytic leukemia?

Chronic lymphocytic leukemia (CLL) is the most common adult leukemia in the Western world. The clinical staging systems by Rai et al. [1] and Binet et al. [2] are based on clinical investigation of lymph node, liver, spleen and laboratory findings if anemia and/or thrombocytopenia. National Cancer Institute–Working Group (NCI-WG) criteria are focused on clinical and laboratory examination but not on imaging technique [3]. According to the criteria, massive splenomegaly as defined by at least 6 cm below left costal margin or progression symptomatic splenomegaly as active disease, which should be clearly documented for therapy. However, no established data of accurate splenic volume (SV) by using computed tomography (CT) exist. Recently, clinical importance of disease status by CT before treatment in CLL is increasing. The present study was conducted to evaluate whether SV by CT would predict the clinical outcome in CLL patients.

We evaluated 61 patients with CLL in Rai II–IV disease, who had checked CT scan before therapy. The inclusion criteria were the following: diagnosis of CLL according to the NCI-WG criteria, abdominal CT scan carried out at diagnosis and no treatment history. The CT scan was carried out in the Radiology Department of the Pusan National University Hospital between December 1998 and July 2007. SV was quantitated from the cross-sectional images by using three-dimensional analytical volume software (Voxar, Ltd, Edinburgh, UK). The computer automatically contours the spleen in each CT slice and calculates the volume of the spleen in cubic centimeter. Chlorambucil dosed with 0.4 mg/kg daily for 7 days every month. Median follow-up duration was 31 months (range 5–89 months). Median SV at the diagnosis was 721.3 cm$^3$ (range 223.7–3576.6 cm$^3$). The analysis of different
cut-off levels between the 25% and 75% quartile using the log-rank test determined that median value (721.3 cm³) as the cut-off point yielded the highest difference in progression-free survival (PFS) and overall survival (OS), which was used as cut-off level in statistical analysis. Therefore, two SV groups (high SV group and low SV group) were separated according to the median value. The baseline characteristics (age, sex, median absolute lymphocyte count, median beta-2-microglobulin, median lactate dehydrogenase level and bone marrow infiltration pattern) were compatible between the high SV group and the low SV group. The low SV group was associated with longer progression-free survival and overall survival than high SV group (P < 0.001, P < 0.001). SVs in PD were higher than those in stable disease (SD) group, while differences of SVs in other response groups were not significant (SVs between complete response and partial response (PR), P = 0.075; PR and SD, P = 0.366; SD and PD, P = 0.019). SVs in Rai stage IV was higher than other Rai stage (P < 0.001). SVs in each Rai stage were significantly different (difference of SVs between Rai II and III, P = 0.005; the difference between Rai III and IV, P = 0.026).

Figure 1. Clinical outcome according to the splenic volume (SV) measured by computed tomography (CT) and correlation between SV by CT and response or Rai stage. Low SV group was associated with longer progression-free survival and overall survival than high SV group (P < 0.001, P < 0.001). SVs in PD were higher than those in stable disease (SD) group, while differences of SVs in other response groups were not significant (SVs between complete response and partial response (PR), P = 0.075; PR and SD, P = 0.366; SD and PD, P = 0.019). SVs in Rai stage IV was higher than other Rai stage (P < 0.001). SVs in each Rai stage were significantly different (difference of SVs between Rai II and III, P = 0.005; the difference between Rai III and IV, P = 0.026).

The result shows that the assessment of tumor volume using imaging technique can be an important predictive factor of prognosis as well as disease progression in CLL patients.

The present study is the first attempt whether the clinical importance of three-dimensional reconstruction of tumor burden using imaging technique is useful in clinical practice. A further well-designed, large clinical study is warranted to confirm the results including fludarabine or rituximab.

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disclosure

The authors declare no conflict of interest

references


doi:10.1093/annonc/mdq621
Published online 14 October 2010