Predictive Value of Platelet during Chemotherapy for Patients with Extremity Osteosarcoma

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Background: There are limited serum biomarkers to predict the survival outcomes for patients with osteosarcoma. Platelet is reported to be effective predictor in many other cancers. However, the prognostic value of platelet on osteosarcoma isn't clearly understood.

Purposes: To explore the prognostic value of platelet during chemotherapy and validate its accuracy for patients with extremity osteosarcoma.

Patients and Methods: A total of 152 patients, admitted before December 31 2013 in the Bone and Soft Tissue Sarcoma Center, the First Affliated Hospital of Sun Yat-Sen University, with extremity osteosarcoma undergoing standard treatment were retrospectively analyzed. Patients with platelet more than 300*10^9/L was defined as high platelet group. Univariate and multivariate analyses were perform to identify the prognostic value of platelet. Patients, admitted after January 1 2014, were prospective enrolled to validate the prognostic value of platelet. Additionally, in the prospective cochort, the relationship of circulating tumor cells (CTCs) and platelet was investigated.

Results: In the retrospective cohort, the 5-year overall survival (OS) was 57.0%, and the median time of follow up was 62.7 months, ranging from 8.5 to 132.3 months. Patients with higher platelet at the time of diagnosis had a poorer 5-year OS than those with normal platelet level (44.8% vs. 62.5%, p = 0.03，Figure 1A). Additionally, Patients with higher platelet had a tendency of higher incidence of lung metastasis at the time of diagnosis (p $<$ 0.05). There was a significant difference between patients with higher and normal average platelet level during adjuvant chemotherapy (46.2% vs. 61.2%, p = 0.04, Figure 1B). No difference was demonstrated between patients with higher and

normal average platelet during neoadjuvant chemotherapy (49.9% vs. 59.7%, p = 0.27). As for patinets with continuous increased platelet during neoadjuvant or adjuvant chemotherapy, the 5-year OS were similar compared with those without continuous increased platelet (49.9% vs. 59.7%, p = 0.27; 48.8% vs. 61.1%, p = 0.06, respectively). In the prospective cohort for validation, 26 patients were enrolled. No survival outcomes can be assessed, because of short follow-up time. However, the platelet level was significantly correlated with number of CTCs at the time of diagnosis (p=0.007, Figure 2).

Conclusions: The pretreatment platelet level and average platelet level during adjuvant chemotherapy were effective predictors for survival of patients with extremity osteosarcoma. Higher platelet plays a negative effect on survival outcomes through cooporating with CTCs potentially. Platelet may be a novel risk stratification factor and intervention target, which needs further study.
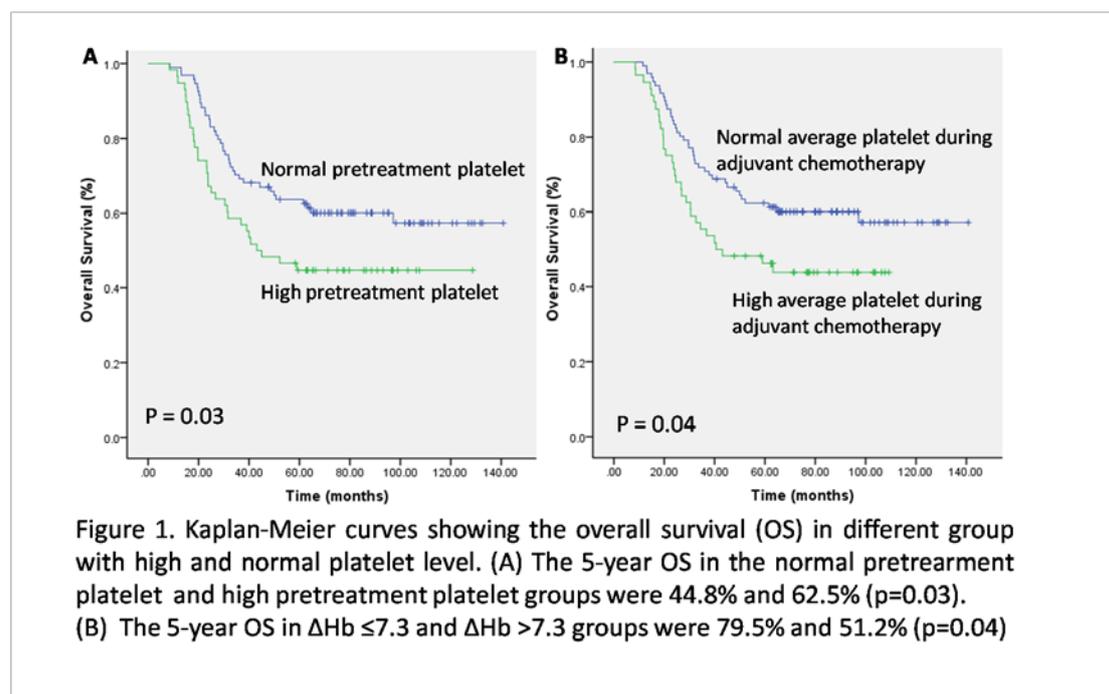

Figure 1. Kaplan-Meier curves showing the overall survival (OS) in different group with high and normal platelet level. (A) The 5-year OS in the normal pretrearment platelet and high pretreatment platelet groups were 44.8% and 62.5% (p=0.03). (B) The 5-year OS in ΔHb ≤7.3 and ΔHb >7.3 groups were 79.5% and 51.2% (p=0.04)
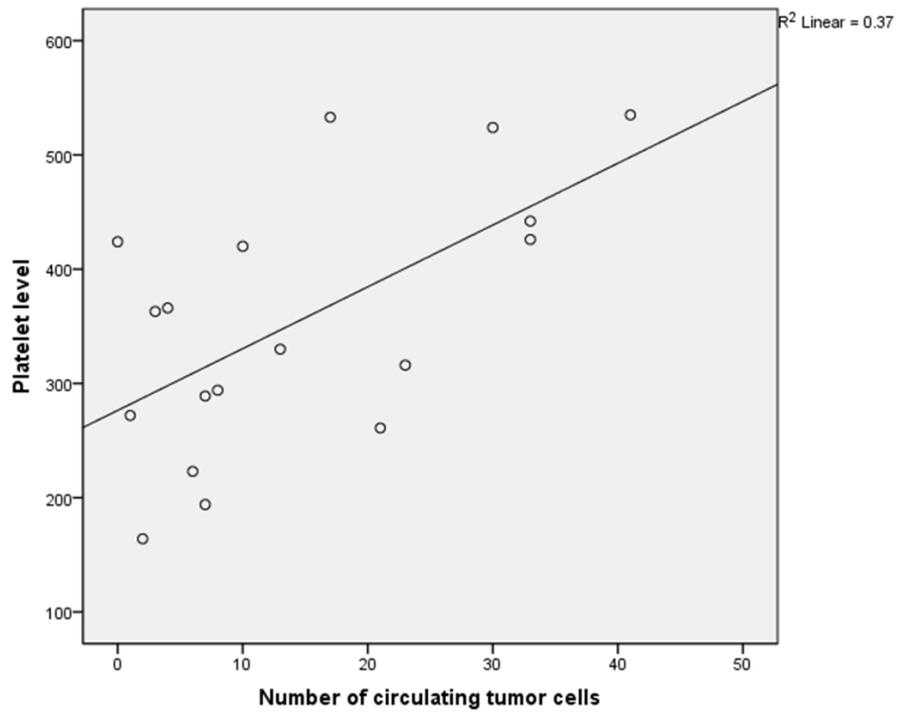
Figure 2. The co-relationship between platelet level and number of circulation tumor cells at the time of diagnosis.