In this article the authors present an alternative interpretation of loop amplitudes in $\mathcal{N} = 4$ super Yang-Mills theory in terms of the operator product expansion (OPE) method. One of the main motivations for this study is to develop calculational techniques for non-MHV amplitudes at multi-loop level, which are of great interest in recent years particularly in the context of dual relation between the gauge-theory amplitudes and the so-called null-polygon Wilson loops. In the article the simplest non-MHV loop amplitude, *i.e.*, the six-point one-loop NMHV amplitude, is analyzed by use of OPE and the resultant form agrees with the previously known results. Generalization to higher-loop amplitudes is also suggested but it is not very clear how that generalization incorporates polylogarithms of any sort into its forms.