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Discrepancy between soluble fibrin and D-dimer levels among sampling sites in elderly patients with femoral neck fracture

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To the editor: Deep vein thrombosis (DVT) is a critical complication in elderly patients with fracture involving the legs [1]. D-dimer (DD) has been used to predict the risk of DVT, but its sensitivity is not high. It has been reported that soluble fibrin (SF) has a higher sensitivity than DD for detecting DVT [2,3]. Because SF is simultaneously produced when fibrinogen is converted to fibrin by thrombin in the coagulation pathway, this marker can directly indicate increased coagulation activity. By contrast, DD is produced when fibrin is broken down by plasmin during the fibrinolysis phase and demonstrates the result of increased coagulation and fibrinolysis activity. However, it has been also reported that DD is more sensitive than SF for predicting DVT [4]. The reason for this discrepancy among reports is unknown [5]. Although SF is thought to be a more sensitive predictor than DD, it is still not known whether SF shows the same values at all sampling points in the body regardless of the site of thrombosis. The site of sampling was usually not described in the literature. We hypothesized that SF may vary among sampling sites compared with DD, and that SF may reflect the regional coagulation condition in elderly patients with femoral fractures.

In the current study, we simultaneously evaluated SF and DD at three venous blood sampling sites during general anesthesia, in veins located at the surface of the bilateral ankles and left forearm. Fourteen patients (age, 73–92 years; male/female, 4: 10) with femoral fracture that required preoperative traction (5.7 ± 2.8 days) and surgical fixation were enrolled in this study. SF and DD were measured automatically with the Coagurex-800 (Sysmex, Kobe, Japan), which utilizes a latex photometric immunoassay (LPIA). This measurement was performed with the following antibodies: Iatoro SF-II (Mitsubishi Medience, Tokyo, Japan) for SF and Nabopia-D-dimer (Sekisui Medical, Tokyo, Japan) for DD.

Figure 1 presents DD values in each patient at the three sampling sites. All patients showed the same value at each sampling site; there was no significant difference between DD in the arm and DD in the legs ($P = 0.84$), as determined by analysis of variation (ANOVA). The correlation coefficient (R^2) between each sampling site was more than 0.985. Figure 2 presents the SF values in each patient at the three sampling sites. The side showing increased SF in the legs varied. Four of the 14 patients showed increased SF on the uninjured side. In these patients, the correlation coefficient (R^2) between each sampling site was less than 0.2. SF in the legs was significantly higher than that in the arm ($P = 0.014$).

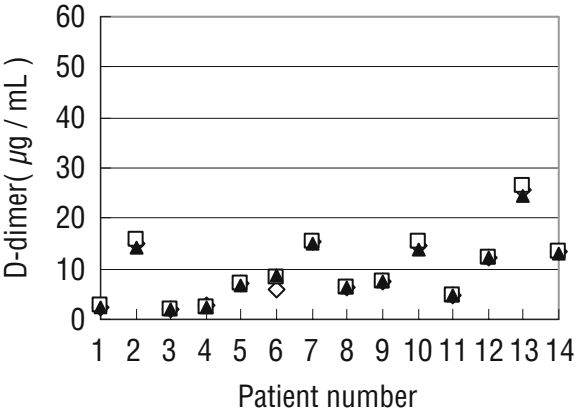

Fig. 1. The D-dimer (DD) values for each patient are shown at three sampling sites. All patients showed the same value at each sampling site. *Diamonds*, Injured side; *squares*, uninjured side; *triangles*, arm

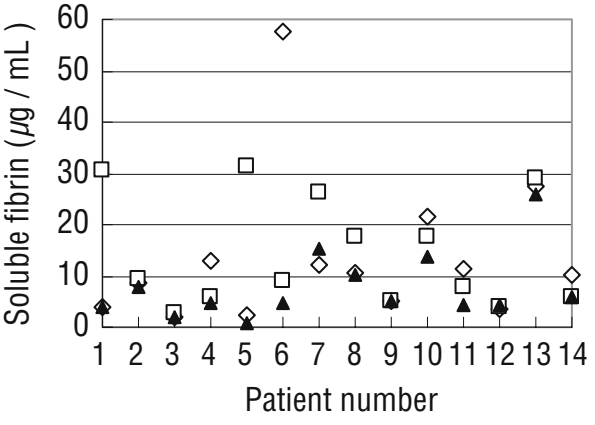

Fig. 2. The soluble fibrin (SF) values for each patient are shown at three sampling sites. The side of increased SF in the legs varied. Four of the 14 patients showed increased SF on the uninjured side. In 9 of the 14 patients, SF did not show identical values at each sampling site. *Symbols*, as in Fig. 1

The usefulness of SF for predicting the risk of DVT remains controversial. SF directly reveals activated coagulation. In the current study, DD tended to show identical values among sampling sites, while SF did not. These data indicate that we

should select the sampling sites before discussing the sensitivity of either DD or SF to evaluate the risk of DVT. SF may be able to indicate locally activated coagulation more sensitively than DD. However, we might misinterpret SF data from a site that is not related to the thrombosis, such as a vein in the arm of a patient with leg fracture. Furthermore, thrombosis may form in either the injured or uninjured side. Therefore, knowing the sampling site for SF is important for understanding the data reported in the literature. In our study, in comparison to SF, DD was more stable at all sampling sites. In this study, we did not examine whether SF or DD was superior for evaluating the risk of DVT, and we reached no conclusion on this question. However, we strongly suggest that more attention should be paid to describing the method used and SF data in studies regarding DVT.

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