Deep Venous Thrombosis (DVT) risk assessment on routine hemodialysis patient using Padua prediction score

Benny Tjan1, I Gusti Ngurah Agung Tresna Erawan2, Yenny Kandarini2

ABSTRACT

Introduction: Hemodialysis requires invasive vascular access (VA) procedure which could emerge deep venous thrombosis (DVT) complication. Apart from VA, other risk factors, either modifiable or unmodifiable, could increase DVT risk. Those factors can be assessed by Padua Prediction Score (PPS). This study aims to assess which risk factors in PPS increase the risk of developing DVT in routine hemodialysis patients at BHCC main clinic.

Methods: This research is a descriptive observational study with simple random sampling. The participants were 58 routine hemodialysis patients in BHCC. The inclusion criteria of this study were the ages above 17 years old, had history hemodialysis more than one, the patient willing to become of the sample subject. The patient that incompletely fulfills the questionnaire were already treated with anticoagulation were admitted for VTE, and had a history of discontinuing hemodialysis were excluded. The data were gathered using a questionnaire according to PPS. The data was analyzed by using SPP 25.0. The descriptive data was provided in a table and pie chart.

Results: Based on the results of the PPS, 11 patients (18.96%) were among the high risk, and 47 patients (81.04%) were at low risk. The most potent risk factor in increasing the risk of DVT is reduced mobility with a risk priority number (RPN) of 30 (severity=3, occurrence=10). Recent (≤one month) trauma and surgery entail on second with an RPN of 24 (severity=2, occurrence=12). The third is occupied by heart and/or respiratory failure with a RPN of 14 (severity=1, occurrence=14). Previous VTE history with a RPN of 12 (severity=3, occurrence=4) placed fourth, followed by age≥70 (RPN=8, severity=1, occurrence=12). The third is occupied by heart and/or respiratory failure with a RPN of 14 (severity=1, occurrence=10). Reduced mobility and obesity are modifiable risk factors that should be eliminated by educating routine hemodialysis patients.

Conclusion: “Reduced mobility” is the most prominent risk factor to increase DVT risk in routine hemodialysis patients, followed by other risk factors. Reduced mobility and obesity are modifiable risk factors that should be eliminated by educating routine hemodialysis patients.

Keywords: deep venous thrombosis, vascular access, hemodialysis, Padua prediction score.


BACKGROUND

Routine hemodialysis gives many physiologic and quality-life benefits to patients with ESRD. Patients undergoing routine hemodialysis should use vascular access (VA). This invasive procedure that potentially harms the vascular must be carefully evaluated because of the various complications. One of the complications of vascular access is deep venous thrombosis. Apart from VA, other risk factors, either modifiable or unmodifiable, could increase DVT risk. Those factors can be assessed by Padua Prediction Score (PPS). PPS had been created to assess the risk of venous thrombosis in patients.1 There are 11 items with their score to assess. The patient with PPS ≥ 4 is categorized in high-risk venous thrombosis.2 Other research about Padua prediction score and thrombin generation found that 73.9% of patients had Padua score<4, and the rest had Padua score ≥4. Comparison of the thrombogram parameters between the two Padua score categories showed no significant difference; lag time (P=0.066), ETP (P=0.266), peak height (P=0.418), and time to peak (P=0.415).3 This study aims to assess which risk factors in PPS increase the risk of developing DVT in routine hemodialysis patients at BHCC main clinic.

METHODS

This research is a descriptive observational study with simple random sampling. The participants of this study were 58 routine hemodialysis patients in the main clinic, BHCC. The data were taken using a questionnaire adjusted to the contents of the Padua Prediction Score while the patient underwent routine hemodialysis. Then we calculated the PPS score and categorized the patient into high or low risk. We also determined which risk factors were most potent to lowest. The inclusion criteria of this study were the ages above 17 years old, had history hemodialysis
more than one, the patient willing to become of the sample subject. The patient that incompletely fulfills the questionnaire were already treated with anticoagulation, admitted for VTE, and had a history of discontinuing hemodialysis were excluded. The data were analyzed by using SPSS 25.0. The descriptive data was provided in a table and pie chart.

RESULT

Based on the results of the PPS, 11 patients (18.96%) were among the high risk, and 47 patients (81.04%) were at low risk. The most potent risk factor in increasing the risk of DVT is reduced mobility with a risk priority number (RPN) of 30 (severity=3, occurrence=10). Recent (≤one month) trauma and/or surgery” entails on second with an RPN of 24 (severity=2, occurrence=12). The third is occupied by “heart and/or respiratory failure” with a RPN of 14 (severity=1, occurrence=14). Previous VTE history with a RPN of 12 (severity=3, occurrence=4) placed fourth, followed by age≥70 (RPN=8, severity=1, occurrence=8) and obesity (BMI≥ 30) with a RPN of 4 (severity=1, occurrence=4) at fifth and sixth respectively. Already known thrombophilic condition is the least risk factor with RPN of 3 (severity=3, occurrence=1). The remaining other factors do not contribute to the increased risk of DVT.

DISCUSSION

Based on PPS, we can see that 18.96% of patients with routine HD in BHCC have a high risk of DVT. In addition to knowing the high-risk percentage, we also look at which risk factors have the most influence on PPS scores, both in low-risk and high-risk patients. From the results, reduced mobility is the most contributor to PPS score with RPN 30. Reduced mobility has the most incidence, namely ten patients. Supported by a high severity score (3) makes reduced mobility the most influential risk factor. Patients who choose reduced mobility are those who are ≥70 years old (RPN = 8, severity = 1, occurrence = 8) and obesity (BMI≥ 30) (RPN = 4, severity = 1, occurrence = 4). This suggests that the risk factors for elderly patients and obesity are positively related to the lack of mobility. Lack of mobility results in stasis of blood flow in the veins, leading to DVT. So it is important to educate obese and elderly patients to do physical activity. If it is not possible to actively move, elastic compression stockings on the knee can reduce the incidence of this risk factor.

The third is occupied by heart and/or respiratory failure with a RPN of 14 (severity=1, occurrence=14). Fourteen patients said they had a history of heart failure and were on routine therapy. Other studies have shown that DVT can occur in 10-22% of CHF patients. This is due to Virchow’s triad and chronic inflammation. The previous VTE history also has an important role with an RPN of 12 (severity = 3, occurrence = 4). DVT that has occurred can cause Post Thrombotic Syndrome (PTS). Within 1 to 2 years after suffering from DVT, PTS manifestations occur in 20-50% of patients.

The already known thrombophilic condition is the least risk factor with RPN of 3 (severity=3, occurrence=1). According to other studies, blood clotting disorders are often caused by genetic factors such as antithrombin III deficiency, protein C deficiency, protein S deficiency, Leiden
mutation in factor V, antiphospholipid syndrome, mutation of the prothrombin 20210A gene, hyperhomocysteinemia, impaired plasmin regeneration and increased factor II, VIII, IX, or XI. The limitation of this study was that the study did not assess another risk factor of DVT besides related with the hemodialysis and was only conducted in one center. We also did not assess the time of VA related to the DVT.

**DISCLOSURE**

**Funding**
None

**Ethical Approval**
The study is exempt from ethical approval in our institution.

**Conflict of Interest**
None.

**Author Contributions**
All of the authors already contributed in this study.

**CONCLUSION**
The risk of thrombosis is not only caused by VA. Thrombosis prevention can be done by proper VA procedures and minimizing risk factors, especially modifiable risk factors. Reduced mobility is the most prominent risk factor to increase DVT risk in routine hemodialysis patients, followed by other risk factors. Reduced mobility and obesity are modifiable risk factors that should be eliminated by educating routine hemodialysis patients.

**REFERENCE**

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