Case Report

Cerebral Venous Thrombosis after Red Blood Cell Transfusion for the Treatment of Iron Deficiency Anemia

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A 57-year-old male presented with generalized seizure who received red blood cell (RBC) transfusion for the treatment of iron deficiency anemia (IDA). Neuroradiological findings revealed cerebral venous thrombosis (CVT) on the left frontal vein. He received anticoagulants, anticonvulsants, and iron supplements. He discharged without any neurological deficit. It should be noted that RBC transfusion might increase the risk of CVT in patients with IDA.

Key Words: Cerebral venous thrombosis—red blood cell—transfusion—iron deficiency anemia

Introduction

The causes of cerebral venous thrombosis (CVT) are various such as prothrombotic conditions, malignancy, polycythemia, and iron deficiency anemia (IDA). Two population-based studies showed that red blood cell (RBC) transfusion was associated with venous thromboembolism (VTE).[1,2] We present a rare case of CVT after receiving RBC transfusion for the treatment of IDA.

Case Report

A 57-year-old male admitted to our hospital due to palpitation and was diagnosed as IDA [hemoglobin value (Hb): 5.3 g/dL, mean corpuscular volume: 59fl]. Hypercoagulability and hyperfibrinolysis were not observed at this point (fibrinogen: 324 mg/dL and D-dimer: .7 μg/mL). He was referred to us because of generalized seizure and right hemiparesis both of which occurred within 10 hours after he had received approximately 800 mL of RBC transfusion. Laboratory examinations revealed hypercoagulability and hyperfibrinolysis [D-dimer: 13.2 μg/mL, thrombin-antithrombin Ⅲ complex: 16.6 ng/mL]. Head Fluid-Attenuated Inversion Recovery image detected hyperintensity area in the left middle frontal gyrus and T2*-weighted image disclosed a hypointensity signal consisted with a left frontal vein suggesting the presence of CVT (Supplementary Figure). The value of protein C and S, homocysteine, antithrombin Ⅲ, and plasminogen activator inhibitor Ⅰ was normal. Lupus anticoagulant, anticardiolipin antibody, anticardiolipin β2 glycoprotein Ⅰ complex antibody, and factor Ⅴ Leiden were negative. There was no evidence of malignancy and hemolytic transfusion reactions. The cause of IDA was inadequate dietary iron intake. He was treated with anticoagulation, anticonvulsants, and iron supplements, and then discharged without any neurological deficit.

Discussion

It is well known that IDA is one of the predisposing conditions for CVT.[3] Chang et al reported using a nationwide database that a significant association was found between prior IDA and ischemic stroke compared to controls.[4]

It has been reported that RBC transfusion as a risk factor for VTE. Thurn et al reported that RBC transfusion is an independent risk factor for postpartum VTE.[1]

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Table 1. *Summary of reported cases with cerebral venous thrombosis secondary to iron deficiency anemia*

First author	Age gender	Symptoms	Comorbidity	Hb (g/dL) MCV (fl)	Serum iron (μg/dL) Ferritin (ng/mL)	Platelet ($x10^4$μL)	D-dimer (μg/dL)	Thrombosed veins	Treatment
Ogata[8]	55 M	Melena, Generalized seizure, hemiparesis	IDA, peptic ulcer	8.7-	18 13.3	27	5.5	SSS	Anticonvulsants Iron supplements
Balci[9]	38 F	Headache, vomiting, hemiplegia	IDA	6.8 58	22 9.9	56	-	Deep cerebral veins, TS	RBC transfusion Anticoagulants Iron supplements
Balci[9]	18 F	Headache, vomiting	IDA	5.7 53	42 8.8	64	-	Deep cerebral veins, TS	RBC transfusion Anticoagulants Iron supplements
Nicastro[10]	63F	Headache, hemiplegia, aphasia	IDA	3.4 -	5.6 2	-	-	SSS, TS, SS	RBC transfusion Anticoagulants
Present case	57M	Generalized seizure, hemiparesis	IDA	8.9 64	10 <4	42	13.2	Frontal vein	Anticoagulants Anticonvulsants Iron supplements

Abbreviations: Hb, hemoglobin, IDA, iron deficiency anemia, MCV, mean corpuscular volume, RBC, red blood cell, SS, sigmoid sinus, SSS, superior sagittal sinus, TS, transverse sinus.
Note that laboratory data of the present case were obtained after the onset of CVT except for serum iron and ferritin.

Goel et al showed that perioperative RBC transfusions were significantly associated with the development of postoperative VTE.[2] RBCs play biologically and clinically important functions in hemostasis and thrombosis.[5] Especially, stored RBCs are reported to have higher procoagulant potential.[6,7]

We reviewed the reported cases with IDA followed by CVT in Table 1.[8-10] Of these, three cases received RBC transfusion as a treatment for IDA. It is generally accepted that RBC transfusion is one of the treatment options for severe IDA. However, our case suggested that RBC transfusion might initiate or aggravate CVT in cases with IDA. Care should be taken for the occurrence of CVT when patients with IDA receive RBC transfusion.

Supplementary materials

Supplementary material associated with this article can be found in the online version at doi:10.1016/j.jstrokecerebrovasdis.2019.104338.

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