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Brief Report

Acute Respiratory Distress Syndrome and Non-Occlusive Mesenteric Ischemia as Major Clinical Manifestations of Thrombotic Thrombocytopenic Purpura: Complete Remission Following Exchange Plasmapheresis

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INTRODUCTION

The typical manifestation of thrombotic thrombocytopenic purpura (TTP) is the pentad of microangiopathic hemolytic anemia (MAHA), thrombocytopenia, neurologic abnormalities, fever, and renal failure. However, the essential features of TTP are MAHA and thrombocytopenia [1], and diffuse microthrombitic lesions in the small blood vessels of one or more organs characterize the pathology of the syndrome. The central nervous system and kidney have been the most common target organs and, thus, the pentad of TTP has been derived. However, microthrombotic manifestation can occur in other organs, including the liver, kidneys, ocular regions, pancreas, and skin, resulting in predominant dysfunction of the particular organs, such as HELLP syndrome [2], hemolytic-uremic syndrome [3], macular detachment, choriocapillaris occlusion and retinal detachment [4], pancreatitis [5], and gangrenous skin lesions [6].

An unusual case of TTP presenting as acute respiratory distress syndrome (ARDS) and later recurring as acute non-occlusive mesenteric ischemia (NOMI) is encountered. The clinical features of the patient are presented and possible pathogenesis is discussed.

CASE REPORT

A 77-year-old woman patient (WT) was admitted because of chills and fever for 24 hours. Previously, 15 years ago the patient underwent splenectomy for pancytopenia due to hypersplenism and the pathologic diagnosis of low-grade non-Hodgkin's lymphoma was established. Following splenectomy, pancytopenia was corrected. Without further treatment the patient did quite well until 2 months prior to this admission. The patient presented with anemia of hemoglobin 9.4 g%. The computerized tomographic scan of the abdomen and pelvis showed multiple para-aortic adenopathy and bone marrow studies revealed extensive involvement of non-Hodgkin's lymphoma. The patient received 2 cycles of combination chemotherapy of cyclophosphamide, vincristine, and prednisone. On admission the patient was slightly disoriented with fever to 102°F, tachypnea of 32 per minute, and tachycardia 100 per minute. Conjunctival pallor was noted. The lungs were clear and the heart revealed sinus tachycardia without gallop. Hemogram showed the white blood cell count of 12,800/μL, hemoglobin 9.4 g%, hematocrit 28.5%, platelet count 126,000/μL. The blood urea nitrogen and creatinine were 21 and 1.3 mg%, respectively. Within 12 hours after admission the patient became increasingly dyspenic and further confused. The patient was transferred to a cardiac-monitored unit. The chest roentgenogram showed slight, but diffuse pulmonary infiltrates and isotopic ventilation-perfusion scan of the lungs was essentially normal. No evidence of congestive heart failure was present. On the 3rd hospital day she became semicomatose, and needed intubation for artificial ventilation. Initial arterial blood gas studies showed a PH of 7.40, pO2 75 mmHg, pCO2 26.0 mmHg, and 02 saturation of 95.2% while on 4 liters of oxygen by a nasal cannula. After intubation, on FiO2 of 40% the PH was 7.45, pO2 70 mmHg, pCO2 32.4 mmHg, and O2 saturation 95.3%. Peripheral blood smear showed occasional schistocytes and the platelet count decreased to 48,000/μL. The reticulocyte count was 4.5%

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TABLE I. Hematologic Data During the Course of TTP

	ARDS phase		NOMI phase	
Normal values	Pre-exchange plasmapheresis	Post-exchange plasmapheresis	Pre-exchange plasmapheresis	Post-exchange plasmapheresis
Hemoglobin (g%)				
12–16	9.0	11.7	12.4	8.8
Hematocrit (%)				
38–45	28.2	34.1	37.3	26.0
Platelet count (per μL)				
150,000–450,000	48,000	78,000	38,000	219,000
Reticulocyte count (%)				
0.5–1.5	4.5	4.2	4.1	2.2
Schistocytes (%)				
<1%	3–5	1–2	3–5	<1
LDH (IU/L)				
90–180	375	120	271	140

and the haptoglobin less than 9 mg% and lactate dehydrogenase level increased to 375 IU/L. The blood urea nitrogen increased to 50 mg% and creatinine to 2.5 mg%. The diagnosis of acute TTP and ARDS was established. In this patient the possible explanation for ARDS was extensive microthrombotic complication of alveolar capillaries due to TTP. On the fourth hospital day, daily 3.5 liter therapeutic plasmapheresis with plasma exchange started. Twenty hours after the first exchange plasmapheresis, the patient regained consciousness and respiratory function markedly improved. Thrombocytopenia and lactic dehydrogenase level also gradually improved (Table I). She was able to be extubated after 5 exchange plasmaphereses. The treatment continued daily for a total of 19 days. On the 24th hospital day, the patient's mental status fully recovered except for generalized weakness, On her way home after discharge she collapsed in the hospital parking lot and was readmitted by another physician.

In the next 24 hours she developed progressive abdominal distension and marked tenderness with mental confusion and disorientation. Bowel sounds were absent. Acute abdomen was evident and the physician did not consider the possibility of recurrent TTP. Although the consulting surgeon considered progressive bowel gangrene, because of unstable vital signs the patient was judged not to be a candidate for surgical exploration. Terminal and supportive care was recommended. However, when the patient was seen by the hematologist, recurrent TTP was diagnosed on the basis of progressive thrombocytopenia and MAHA (Table I). It was proposed that acute abdomen was due to NOMI caused by multiple microthrombi in the capillaries of the mesenteric vasculatures. As a last resort, exchange plasmapheresis was reinstituted using 3.5 liters of plasma. After four exchange plasmaphereses, the patient regained consciousness and the signs of acute abdomen rapidly improved. Both NOMI and TTP, after 17 daily exchange plasmaphereses, achieved complete remission. The treatment tapered to every other day and she had a total of 20 therapeutic exchange plasmaphereses. On 9 months follow-up at the office she was in normal physical vigor without residual abnormalities of previous central nervous system, renal, pulmonary, and bowel involvement of TTP.

COMMENTS

In our patient, in addition to acute TTP, initially predominant clinical features were ARDS. Persistent hypoxia with diffuse pulmonary infiltrates and without evidence of congestive heart failure, pulmonary emboli, pneumonia, pleural effusion, and other lung diseases was consistent with ARDS. Acute abdomen, which was the main clinical feature after readmission, was suspected to be due to NOMI. Both ARDS and NOMI were explained by underlying TTP and responded to exchange plasmapheresis. TTP likely resulted in extensive microthrombi in the pulmonary alveolar capillaries and later mesenteric arteriolar vasculatures. Without exchange plasmapheresis, this patient certainly might have succumbed to either condition alone, which might have led to progressive multiorgan failure. These clinical responses support that in our patient ARDS and NOMI were likely clinical manifestations of TTP.

There have been reports of ARDS presenting as a major clinical feature of TTP [7,8]. In our institution, ARDS often has been the initial and prevailing clinical manifestation in some patients with postoperative TTP. In those patients, the pulmonary capillaries were suspected to be the sites of diffuse microthrombi. Clinical features of NOMI are unexplained abdominal pain, distension, tenderness, hypoactive bowel sounds, and progression to multiorgan involvement, resulting in cardiac, renal, hepatic, and respiratory failure and central nervous system dysfunction. The pathophysiologic theories have included decreased blood flow in the mesenteric vasculatures, increased metabolic demand, and poorly defined coagulopathy [9]. Also, diffuse microthrombi in the mesenteric vasculatures can be another pathophysiologic

mechanism. It is known that sepsis-related NOMI may occur with thrombotic microangiopathy and thrombocytopenia [10]. In view of our experience with this patient, it can be proposed that some cases of ARDS and NOMI are the manifestations of TTP.

As in TTP, exchange plasmapheresis was an effective treatment for our patient. The recovery was possible because of a high index of suspicion and timely treatment. It should be emphasized that the clinical manifestations of TTP are diverse, depending upon which organs are involved by diffuse microthrombi. Since ARDS and NOMI can be caused by diffuse microthrombi in the alveolar capillaries and mesenteric vasculatures, TTP should not be overlooked in the differential diagnosis of ARDS and NOMI. Early recognition of the diagnosis is crucial since the time to the institution of exchange plasmapheresis after the onset of TTP is an important factor in determining the outcome of the patient.

REFERENCES

1. Chang JC, Shipstone A, Llenado-Lee MA: Postoperative thrombotic thrombocytopenic purpura following cardiovascular surgeries. Am J Hematol 53:11–17, 1996.
2. McCrae KR, Samuels P, Schreiber AD: Pregnancy-associated thrombocytopenia: pathogenesis and management. Blood 80: 2697–2714, 1992.
3. Drummond KN: Hemolytic uremic syndrome: then and now. N Engl J Med 312:116–118, 1985.
4. Jellie HG, Gonder JR, Canny CL, Arce FP, Kaufmann JC: Ocular involvement in thrombotic thrombocytopenic purpura: the angiographic and histopathological features. Can J Ophthal 19:279–283, 1984.
5. Olsen H: Thrombotic thrombocytopenic purpura as a cause of pancreatitis: report of a case and review of the literature. Am J Digest Dis 18:238–246, 1973.
6. Luttgens WF: Thrombotic thrombocytopenic purpura with extensive hemorrhagic gangrene of the skin and subcutaneous tissue. Ann Intern Med 46:1207–1213, 1957.
7. Bone RC, Henry JE, Petterson J, Amare M: Respiratory dysfunction in thrombotic thrombocytopenic purpura. Am J Med 65:262–270, 1978.
8. Howard TP: Fulminant respiratory failure: a manifestation of thrombotic thrombocytopenic purpura. JAMA 242:350–351, 1979.
9. Wilcox MG, Howard TJ, Plaskon LA, Unthank JL, Madura JA: Current theories of pathogenesis and treatment of nonocculsive mesenteric ischemia. Digest Dis Sci 40:709–716, 1995.
10. Benjamin E, Oropello JM, Iberti TJ: Acute mesenteric ischemia: pathophysiology, diagnosis, and treatment. Dis Month 39:131–210, 1993.