

SHORT REPORT

Paraplegia Due to Extramedullary Hematopoiesis in the Thalassemia Intermedia

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Extramedullary hematopoiesis (EMH) is a rare condition encountered in chronic hemolytic disorders. In order to compensate for long-lasting anemia in thalassemia, intermedia extramedullary hematopoiesis (ITEMH) in the liver, spleen and lymph nodes and in rare circumstances in the paravertebral and retroperitoneal regions, spinal cord, scalp, pelvis, surrenal glands, pleura, thymus, breast, prostate and kidneys can be seen (1,2). Spinal cord compression due to EMH is a very rare complication. Its treatment is not clear (2-4).

Case Report

A 24-year-old male diagnosed with thalassemia intermedia since the age of 3 years was admitted to hospital because of back pain, weakness and dysesthesia in his legs that had progressed over the week prior. His past medical history revealed splenectomy at the age of 7 years, lung tuberculosis at the age of 14 years and pericarditis which had occurred 2 months before.

On examination, he was pale with icteric scleras. His blood pressure was 110/80 mmHg, pulse rate was 80/min and rhythmic and his fever was 36.5 °C. The liver was enlarged 4 cm below the rib edge. It was hard on palpation without any sensitivity. On neurologic examination, he was paraparetic, and muscle strength was 3/5 on the proximal and 2/5 on the distal muscles on both sides. Deep tendon reflexes were hyperactive and

the plantar responses were extensor on both sides. Hypoesthesia and hypoalgesia were present to the level of the sixth thoracal vertebra. Proprioception and vibration was absent to the level of the crista iliaca.

On laboratory examination, his hemoglobin levels were 10.2 g/dl, hematocrit 32.3 %, erythrocyte count 3,960,000/mm³, MCV 78.0 fl, MCHb 25.8 pg, MCHC 33.0 g/dl, leukocyte 4680/mm³ (PMNL 45.2%, lymphocyte 48.4%, monocyte 6.4%) and his thrombocyte count was 375,000/mm³. Blood smear, microcytosis, hypochromy, anisocytosis, poikilocytosis and target cells were present. Blood biochemistry revealed AST 63 U/l, ALT 61 U/l, total bilirubin 1.98 mg/dl, and direct bilirubin 0.4 mg/dl, while kidney function tests were normal. On hemoglobin electrophoresis, HbA was 83.0% (N 96%), HbF 14.4% (N < 1%) and HbA₂ 2.6% (N 2.5-3.5%). On thoracal spinal magnetic resonance imaging multiple, lobulated mass lesions not showing any calcification and without any bone destruction were present at the third and seventh thoracal levels on the posterior side (Figure 1). He underwent urgent surgery and total laminectomy was performed through the third to ninth thoracal vertebrae. Osseous pathology was not present. A solid extradural mass with a fibrous capsule was fully removed. The pathologic examination of the mass lesion revealed hypercellular bone marrow due to erythroid serial hyperplasia. Very rapid regression was observed after

surgery. He was given blood transfusions. Magnetic resonance imaging taken after the operation is shown in Figure 2. His examination 1 month post-operation was completely normal.

Discussion

Thalassemia is a genetic disease showing autosomal recessive inheritance characterized by a defect in the synthesis of the globulin part of hemoglobin. It can be either in the homozygote (T. major) or heterozygote form. Heterozygote patients are usually asymptomatic with mild anemia. The clinical picture in the homozygote patients is severe and is called Cooley's anemia. Mild forms in homozygote patients are termed thalassemia intermedia. This form shows a course between thalassemia major and minor according to the severity of

the illness, and has genotypical variances. In homozygote beta thalassemia, excessive alpha chain production causes intramedullary erythroid destruction and peripheral hemolysis. Together with 3 compensation mechanisms, anemia develops. Firstly, it causes skeleton modification by spreading red bone marrow, and then EMH develops in the liver, spleen and lymph tissues. Next gamma chain synthesis develops. This gamma chain forms HbF by joining part of the excessively increased alpha chains. The frequency of HbF is more than 5% in heterozygote thalassemia and it is more than 15% in homozygote patients (5). In our patient, HbF was 14.4%.

In thalassemia intermedia, despite chronic anemia there is no need for blood transfusions. Hemoglobin concentrations are between 6 and 9 g/dl. Paleness, intermittant jaundice, splenomegaly and facial bone



Figure 1. Preoperative MRI.



Figure 2. Postoperative MRI.

changes are observed. At adult age pathological fractures, colelithiasis and thoracic mass lesions consisting of hematopoietic tissue can be seen. Spinal cord compression due to intrathoracic EMH is extremely rare (1,5).

EMH is a compensatory mechanism necessary to sustain sufficient erythropoiesis. It is a very rare finding. It is encountered in cases where increased production of one or more shaped elements of blood occurs, such as erythroblastosis fetalis, pernicious anemia, thalassemia, sickle cell anemia and various other types of anemia, and in disorders like hereditary spherocytosis. The lesions recorded in various organs and tissues are microscopic and they rarely enlarge (4-6). According to Abbassioun et al. intrathoracic EMH is either caused by the direct spread of paravertebral localized activated precursor cells

producing a paravertebral mass lesion or by the existence of hematopoietic precursor cells in the extradural area locally (1). Intrathoracic extramedullar hematopoiesis is generally localized at the posterior mediastinum, and the middle and lower paravertebral areas. The mechanism of spinal cord compression at this site is the localization of the precursor cells as well as limited mobility of the spinal cord at the same localization (1,4). This type of complication takes place as case presentations in the literature have shown, with the first patient reported in 1954 by Gatto et al. (7). In our patient the lesion was localized between the T3 and T7 segments.

The diagnosis can be made by computerized tomography (CT) and magnetic resonance imaging (MRI). The patients are usually asymptomatic at the early stage of the illness. At later stages, the lesions enlarge and may

cause spinal cord compression or massive hemothorax (3,8). CT and MRI show the topographic localization of the lesions. On CT, active lesions show high density and are enhanced with a contrast injection. Nonactive lesions are hypodense as they contain fatty substances and do not show contrast enhancement (4,8). On MRI, active lesions show hypointense signals both on T1 and T2 weighted images, but during the remission phase they show hyperintense signals. A peripheral ring having hyperintense signals is a pathognomonic finding (8). The MRI features of our patient were consistent with intrathoracic EMH. As the lesion did not show calcification, and as the vertebrae and ribs were intact, neurogenic tumors were excluded.

On treatment, various options are available. Abbassioun et al. proposed surgical decompression and low dose radiotherapy to the lesion area afterwards for the treatment of EMH. If the patient is asymptomatic and has partial block, they propose local radiotherapy and systematic corticosteroid application as the best therapy method (1). Another treatment model for spinal cord compression depending on EMH according to Mann et al. is partial excision and hypertransfusion application. They

propose radiation treatment for those who do not show regression after this therapy. It is stated that repeated blood transfusions suppress EMH more successfully, and as a patient's general condition gets better, cardiac dilatation decreases in many cases, and the liver and spleen get smaller. However, more frequent transfusions cause excessive iron accumulation. Chelating agents can prevent this situation. Radiotherapy, used in patients refractory to therapy, causes edema, worsens symptoms and results in pancytopenia (7). Our patient was treated by blood transfusions and mass excision. Deferoxamine was used as a chelating agent.

In conclusion, it can be presumed that patients with chronic anemia presenting with intrathoracic spinal lesions must be suspected of having EMH as well.

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References

1. Abbassioun K, Amir-Jamshidi A. Curable paraplegia due to extradural hematopoietic tissue in thalassemia. *Neurosurgery* 11: 804-7, 1982.
2. Boyacıgil S, Ardiç S, Tokoğlu F, et al. Intrathoracic extramedullar hemapoiesis. *Australas Radiol* 40: 179-81, 1996.
3. Aliberti B, Patrikiou A, Terentiou A, et al. Spinal cord compression due to extramedullary haematopoiesis in two patients with thalassemia: complete regression with blood transfusion therapy. *J Neurol* 248: 18-22, 2001.
4. Tamburrini O, Della Sala M, Mancuso PP, et al. The diagnostic imaging of intrathoracic extramedullary hematopoiesis. *Radiol Med* 84: 582-6, 1992.
5. Lukens JN. The Thalassemias and related disorders: quantitative disorders of hemoglobin synthesis. *Wintrobe's Clinical Hematology*. Lee GR, Bithell JC, Foerster J, et al. (eds.). Philadelphia. 1993, p: 1122- 1123.
6. Amirjamshidi A, Abbassioun K, Ketabchi SE. Spinal extradural hematopoiesis in adolescents with thalassemia. Report of two cases and a review of the literature. *Childs Nerv Syst* 7: 223-5, 1991.
7. Mann KS, Yue CP, Chan KH, et al. Paraplegia due to extramedullary hematopoiesis. Case report. *J Neurosurg* 66: 938-40, 1987.
8. Nastri G, Cappellini M, Cappellini MD, et al. Thoracic localizations of extramedullary erythropoiesis. *Radiol Med* 84: 576-81, 1992.