Case Report

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Oncology Section

Progressive Paraparesis due to Extramedullary Haematopoiesis in Thalassaemia Intermedia Treated Successfully with Radiotherapy: A Case Report

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ABSTRACT

Extramedullary Haematopoiesis (EMH), a rare complication of Thalassaemia Intermedia (TI), can present with pressure symptoms including Spinal Cord Compression (SCC) and can be treated using surgery, radiotherapy, hypertransfusion, or hydroxyurea. Hereby, the authors present a case report of a 20-year-old male young thalassaemic patient presented with progressive paraparesis. Neurological examination suggested SCC, and Magnetic Resonance Imaging (MRI) of the spine revealed paravertebral masses due to EMH. The patient was treated with radiotherapy to a dose of 30 Gy over three weeks. There was immediate, near-complete resolution of symptoms, and the patient could walk without assistance. He has been doing well since 1.5 years of treatment. So, in cases of TI, one should think of EMH as a differential diagnosis for paraparesis. Early clinicoradiological diagnosis of EMH-induced SCC is necessary and possible, as there is a high chance of complete remission of symptoms with radiotherapy, which is a non invasive and effective treatment option.

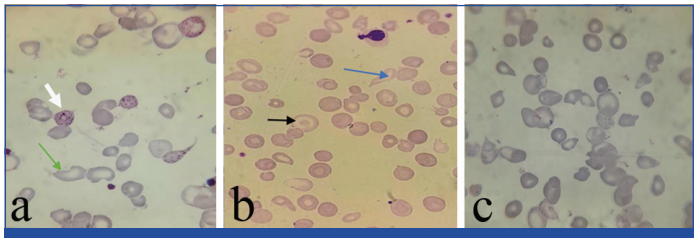
Keywords: External beam radiotherapy, Magnetic resonance imaging, Spinal cord compression

CASE REPORT

A 20-year-old male patient presented with complaints of tingling and numbness in both feet, along with progressive difficulty in standing, walking, slippage of footwear without awareness for the last seven months. There was no history of loss of bladder or bowel control, back pain, or weakness in the upper limbs. He was diagnosed with Haemoglobin E-β (HbE-β) thalassaemia at the age of five years. As the patient did not depend on frequent blood transfusions, the diagnosis was classified as Thalassaemia Intermedia (TI). The Haemoglobin (Hb) level was maintained at 6-8 g/dL after the diagnosis. There was no history of spontaneous or trauma-induced bone fractures.

On clinical examination, the patient was conscious, alert, and cooperative. The height and weight of the patient were 161 cm and 53 kg with a normal build. He had characteristic facies with frontal bossing and malar prominence. He was pale and mildly icteric. The cranial nerves examination revealed no abnormality. The motor examination of both lower limbs revealed normal tone with mild loss of power (Medical Research Council scale [1] for muscle strength: Grade 4/5) in the flexor group of muscles of both hip and knee joints. The power of other groups of muscles (extensors of hip and knee joints, dorsiflexors and planterflexor of both ankle joints) was within normal limits. The deep tendon reflexes were exaggerated in both lower knee joints and normal in both ankle joints. Bilateral plantar reflexes were extensor. The motor and sensory neurological findings of both upper limbs were within normal limits. There was no bony tenderness over the vertebrae.

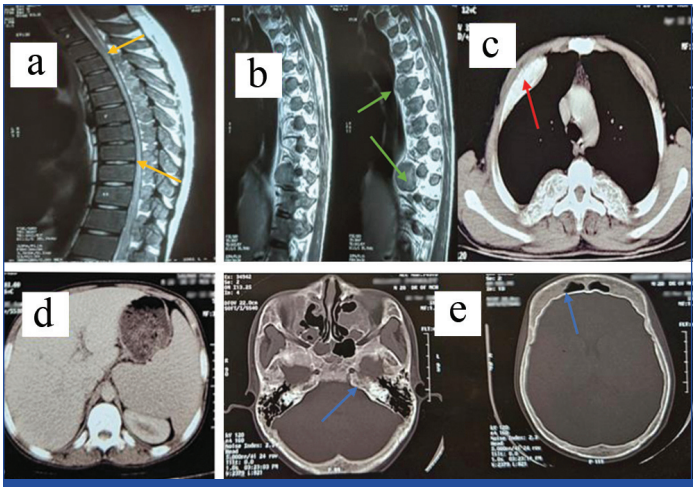
The laboratory investigations were as follows: Hb-7.90 g/dL (13-17 g/dL in males, 12-15 g/dL in females), Total Leukocyte Count (TLC)-18,800/cumm (4,000-11,000/cumm), platelet count-185×103/cumm (150-400×103/cumm), Mean Corpuscular Volume (MCV)-74.4 fL (80-100 fL), Mean Corpuscular Haemoglobin (MCH)-21.1 pg (27-31 pg), Red Cell Distribution Width (RDW)-30.4 (12-15). Hb electrophoresis showed Adult Haemoglobin (HbA) 8.5% (95-98%), Foetal Haemoglobin (HbF) 40.4% (<0.6%), and HbA2 53.3% (2-3%). Biochemical investigations showed serum bilirubin- 3.4 mg/dL (0.1-1.2 mg/dL), unconjugated bilirubin- 2.3 mg/dL (0.2-0.8 mg/dL), serum urea- 37 mg/dL (5-20 mg/dL), serum creatinine- 1.1 mg/dL (0.7-1.3 mg/dL). The peripheral blood smear showed marked anisopoikilocytosis, microcytic severely hypochromic Red Blood Cells (RBCs), teardrop cells, target cells, elliptocytes, schistocytes, basophilic stippling, and polychromatophils, with an overall impression of microcytic hypochromic anaemia with haemolysis [Table/Fig-1a-c].



[Table/Fig-1]: Peripheral blood smear (stained with Leishman stain and examined under 100x) findings: a) Basophilic stippling (white arrow), schistocyte (green arrow); b) Target cell (black arrow), tear drop cell (blue arrow); c) Anisopoikilocytosis, microcytic hypochromic RBC.

Magnetic Resonance Imaging (MRI) of the spine showed a lobulated hyperintense lesion involving the paravertebral portion with involvement of the spinal canal has been depicted in [Table/Fig-2]. The lesion extended from the D3-D4 level downward to the D12 level. The radiological appearance strongly suggested Extramedullary Haematopoiesis (EMH) in the context of an underlying haematological condition. Contrast-enhanced Computed Tomography (CECT) of the brain and chest showed evidence of EMH. CECT of the abdomen showed hepatosplenomegaly [Table/Fig-2]. So, the case was diagnosed as EMH in the background of Thalassaemia Intermedia, presented with clinical features of Spinal Cord Compression (SCC).

The present patient was deemed a poor candidate for surgical decompression due to the large extent of the lesion, the risk of



[Table/Fig-2]: The MRI scan of spine, yellow arrow indicates level of Spinal Cord Compression (SCC), green arrow indicates paravertebral masses due to EMH; c) CECT thorax, red arrow indicates EMH involving rib; d) CECT abdomen showing hepatosplenomegaly; e) CECT brain, blue arrow showing EMH involving the skull bones.

haemorrhage, and haemodynamically instability due to anaemia. Consequently, radiotherapy was planned for the patient. Initially, the patient received 20 Gy in 10 fractions (2 Gy per fraction) over two weeks delivered by a 6 MV photon beam in a linear accelerator. The radiation dose was escalated to 30 Gy in view of good clinical response and tolerable haematological toxicities. Corticosteroids was given during radiation at a dose of 8 mg twice daily, which was then gradually tapered within two weeks after completing radiation. The power of both lower limbs improved during radiation treatment. The patient was able to stand and walk unaided after completion radiation therapy. A follow-up MRI scan done, six weeks after completing radiotherapy showed residual disease, but the clinical response was excellent. The patient has been followed up for the last 1.5 years and is still doing well.

DISCUSSION

The clinical phenotype of β-thalassaemia who does not require frequent blood transfusion is termed as TI [2]. EMH is the production of blood cell precursors outside the bone marrow, which occurs in TI as a compensatory mechanism to overcome a chronic hypoxic state [3]. Case reports of present condition have shown that the mid and lower thoracic region of the spine has a predilection for SCC due to EMH in thalassaemia patients, which can be related to the smaller diameter of the spinal canal and limited mobility [4,5]. The clinical features can be described under the following headings: a) generalised feature is fatigue; b) thoracic manifestations include bilateral paravertebral masses, rib expansion; c) abdominal manifestations include hepatosplenomegaly, perirenal involvement; d) neurological manifestations include seizure, hydrocephalus, cord compression [6]. Some of the important differential diagnosis are lymphoma, sarcoma, metastatic disease, Castleman's disease [6]. Though biopsy is the gold standard for tissue diagnosis, it carries a risk of catastrophic haemorrhage. Thus, MRI became the imaging modality of choice for the diagnosis and follow-up for SCC due to EMH [5]. The radiological appearance of EMH is isointense on T1-weighted MRI and hyperintense on T2W-weighted MRI [7].

There is no standard treatment guideline available for this condition as most of the cases were reported sporadically [8]. Different treatment modalities were used like hypertransfusion, surgical decompression, radiotherapy, and hydroxyurea [9]. Surgical excision with or without radiotherapy is an effective treatment option [4,10]. But radical excision of the EMH mass was not always possible due to the difficult site, risk of bleeding, and nerve injury [11]. On the other hand, haematopoietic tissue is very radiosensitive, thus rapid shrinkage of the EMH mass is possible with radiation. There are case reports available in the literature where an excellent response was achieved after treating with radiotherapy alone [12,13]. Saha A et al., described a case of thalassaemia with SCC due to EMH in a 21-year-old female whose neurological symptoms recovered nearly completely with External Beam Radiation Therapy (EBRT) [14]. Munn RK et al., in 1988 showed that radiotherapy with corticosteroid is an effective treatment option, and the response is usually long-lasting [15]. The overall prognosis of present condition is said to be good, if earlier detection and prompt treatment can be administered.

CONCLUSION(S)

The Spinal Cord Compression (SCC) due to Extramedullary Haematopoiesis (EMH) in the background of thalassaemia or any other haematological disorders is a rare phenomenon. Prompt diagnosis through thorough clinical examination, MRI of the spine, followed by radiotherapy alone or in combination with other treatment options, results in a good and long-lasting response. The case reported by authors showed a very good clinical response, when treated with radiotherapy in a 20-year-old male thalassaemia patient, who presented with progressive spastic paraparesis due to EMH.

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