

Spinal cord compression due to extramedullary hematopoiesis in patient with Beta thalassemia major

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September 16, 2020

Abstract

we reported an 18 years old male with beta thalassemia major who presented with back pain progressive over 1 month associated with numbness in thighs, together with lower limbs weakness and difficulty walking. he also mentioned having difficulty in passing urine. he received radiotherapy which results in significant improvement in symptoms

Introduction

Haemoglobinopathies constitute the commonest recessive monogenic disorders worldwide. They fall into two main groups: the thalassemia syndromes and the structural hemoglobin variants (abnormal hemoglobin). α , β , and $\delta\beta$ thalassemia are the main types of thalassemia with clinical importance; the most frequent and clinically important structural hemoglobin variants are HbS, HbE, HbC and HbD. The treatment of patients presents a substantial global disease burden. Variants of thalassemia and main abnormal hemoglobin interact to produce a wide range of clinical disorders of varying severity (1). From clinical perspective thalassemia syndromes were classified into Transfusion dependent thalassemia and non-transfusion dependent thalassemia (2). Most of the complications of thalassemia results from iron over load with liver and heart being the main cause for morbidity and mortality (3). Other complications mainly endocrine like osteoporosis (4), Diabetes (5), Thyroid (6), Hypogonadism and fertility (7)(8), As well as cortisol abnormalities (9). Patient with thalassemia should go for ALLO-SCT (Allogeneic stem cell transplantation) if HLA identical sibling is available or to maintain transfusion and chelating therapy lifelong in the form of Desferal, Deferiprone or deferasirox or its new film coated formula (10).

The risk of neurologic compromise in this disease is in part due to the fact that extramedullary hematopoiesis within the spinal canal can result in the compression of neural structures. There have only been a few reports in the literature describing spinal cord compression by such a disease process (11)(12)

treatment options have been described, including transfusion therapy (13)(11), laminectomy, radiotherapy (12)(14)(15), and the use of fetal hemoglobin inducing agents that decrease the hematopoietic drive. However, the ideal management regimen remains controversial.

Case presentation

An 18 years old male known to have beta thalassemia major on regular blood transfusion every 3 weeks (figure 1). he is on deferasirox (iron chelator agent) but he is not compliant with it and oral hydroxyurea 1000 mg daily. presented to the emergency department with history of mid thoracic to lower back pain progressive over 1 month associated with numbness in his both thighs, together with lower limbs weakness and difficulty in walking. he also mentions having difficulty in passing urine. He denies any other symptoms. And no history of trauma.

His labs showed hemoglobin 8.6 gm/dl, leukocytes count and platelet were normal. his bilirubin total was 80.9 umol /l and direct bilirubin 13.2 umol/L, ALT 56.2 U /L and ALT 64 U/L, and ferritin 2345 mcg/L, other labs unremarkable (table 1). on examination he had spastic gait, lower limb examination showed hyperreflexia with positive ankle clonus, plantar upgoing bilaterally, strength in hip flexion was 4/5 bilaterally otherwise 5/5 for the remaining muscles group, absent vibration and decrease sensation in lower limbs with no specific dermatome, mild spasticity more in left leg , PR showed decrease sensation and normal tone. cranial nerves and upper limb examination both were normal

MRI spine showed intraspinal posterior extramedullary epidural lobulated lesions extending from lower border of T2 vertebral body up to T9 vertebral body. They demonstrate immediate to low T1WI signal intensity and dark T2WI signal intensity with mild heterogenous postcontrast enhancement (figure 2, A, B). They are causing moderate to severe spinal canal stenosis and significant compression and anterior displacement as well as thinning of the spinal cord. There is intermedullary high T2WI signal intensity at the compressed segment of the spinal cord suggesting edema and/or myelomalacia. Similar intraspinal anterior epidural lesions are seen at T7 and T10 levels and seen extending through bilateral exiting neural foramina; left more than right (figure 2, D, E). Similar anterior intraspinal lesions are seen at L5-S1 level (figure 2, C) demonstrating interval increase in size, as compared to previous MRI lumbar spine done two years ago compromising the thecal sac. Impression was intraspinal epidural lobulated lesions causing significant neural compromise, the appearances are highly suggestive of extramedullary hematopoiesis.

Patient seen by neurosurgery team and they advise for radiotherapy before any surgical intervention for the follow reasons ; the extramedullary hematopoiesis tissue is radiosensitive , beside that the lesion involves long segment of spinal column (almost from T2-T9) so surgery will involve bone removal (hemilaminectomy) in all levels and may affect stability of spinal column , lastly the Patient has weak fragile bones related to his general condition and In case of instrumentation and fusion , there is high probability of failure , and they suggest that In case of failure of radiotherapy , they can offer the surgical option to the patient with major risks due to above mentioned reasons .

Oncology radiotherapy saw the patient and decided to proceed to radiotherapy. patient admitted to hospital started on intravenous dexamethasone waiting for the radiotherapy, he received blood transfusion as well to improve his hemoglobin from 7.5 to 11.2 gm /dl. Later on, admission he received ten session of radiotherapy with significant improvement in his weakness and other neurological symptoms.

Discussion

Extramedullary hematopoiesis is a rare manifestation of thalassemia that was first described by Guizetti during an autopsy in 1912 (16). Gatto was the first to describe spinal cord compression from the extramedullary overgrowth of the hematopoietic tissue(17).the diagnosis of the disease depends on symptoms which is confirmed by MRI finding . the male-to-female ratio for spinal cord compression by extramedullary mass was 5:1. Thoracic cord compression was seen primarily in the lower thoracic spine(11). Extramedullary hematopoiesis occurs in multiple blood disorders including thalassemia. The usual organ involvement includes the liver, spleen, bone marrow and lymph nodes. The onset of neurologic symptoms in a patient with such underlying blood dyscrasias should prompt a high clinical suspicion for cord compression or thecal sac compression by an extramedullary hematopoietic process. The treatment modalities available to such patients are limited. Intervention options have included multiple blood transfusions to downregulate erythropoietin production, radiation therapy to stop the production of overgrown marrow tissue, surgical decompression or a combination of any of the above(11)(18). The relative benefit of one treatment over another has not been clearly established due to the infrequency of this disorder. The risks of surgical treatment include excessive bleeding in a patient with a low hemoglobin and difficulty in transfusion due to antibodies and cardiopulmonary stress. The benefit of surgery includes immediate resolution of compression and its symptoms upon decompression. Surgical decompression also provides a good histologic diagnosis. Lau et al, report the case of a 28-year-old woman with cord compression in the thoracic spine who underwent surgical decompression with immediate postoperative recovery of weakness. A complete resolution of symptoms had occurred at 2 months follow-up. Multiple transfusions were also required to maintain the hemoglobin above 10 g/dl(18).our patient was

reviewed by neurosurgery initially but as mentioned before , surgery was decline and he offered low dose radiotherapy instate . The risks of radiotherapy in the treatment of cord compression in such patients include the lack of any tissue for histological diagnosis and the risks involved with radiation exposure. The benefits include ready availability, effectiveness in the resolution of symptoms in a short period of time and reduction of local recurrence(19). Abassioun and Amir-Jamshidiin 1982 reported the case of a 15-year-old female who was paraparetic with long tract signs(20). The patient’s symptoms resolved after 1500 cGy of radiation in five treatments with only residual right sustained clonus. Kaufman et al also reported two patients with thalassemia who underwent radiation therapy with resolution of symptoms in 3–7 days(19). Singhal et al in a review of the literature argue that radiation therapy should be the primary modality for treatment, and surgical intervention and transfusion should be reserved for the recurrent cases post-radiation(21). The radiation dosage used mostly in different treatment protocols included a range between 1000 and 3000 cGy. Our patient received 2000 cGy for ten sessions with good response evident by resolution in his symptoms and with no complications.

Conclusion

Extramedullary erythropoiesis is a natural tissue response to a low hemoglobin count in patients with thalassemia. This may cause neurologic conditions such as spinal cord compression. Rapid diagnosis and treatment are important to prevent further neurological injury and improve functional outcome in such patients. For the Previous mentioned reasons and by reviewing the literature, we conclude that in patients with thalassemia and spinal cord compression, radiation can be effective in resolution of the symptoms.

Acknowledgment

The authors would like to acknowledge the internal medicine residency program and Qatar National Library for their support.

Statement of Ethics

The patient consented to the publication of his case.

Disclosure statement

The authors have no conflict of interest.

Funding sources

This work was funded by Qatar National Library.

Authors contributions

Dr. Eihab A. Subahi and Dr. Mohamed A. Yassin wrote and edited the manuscript. Dr. Mohamed Abdelrazek reviewed the MRI images and provided us with labelled images.

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