Extramedullary haemopoiesis in thalassemia intermedia presenting as paraplegia

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Summary Extramedullary haemopoiesis causing spinal cord compression is a rare manifestation of thalassemia. We describe a 17 year old male with thalassemia intermedia who presented with progressive paraplegia and sphincter disturbance. Magnetic resonance imaging revealed an epidural lesion extending from T5 to T8 compressing the spinal cord. The patient recovered completely.
after surgical decompression with postoperative radiation therapy. Histological examination of the lesion confirmed the diagnosis of extramedullary haemopoiesis. Clinical awareness of this phenomenon with early treatment is essential for optimizing the neurological outcome. © 2002 Published by Elsevier Science Ltd.

INTRODUCTION

Extramedullary haemopoiesis (EMH) occurs as a compensatory phenomenon in chronic anaemias such as thalassemia, myelofibrosis and sickle cell anaemia.1–3 The liver, spleen and lymph nodes are frequently affected organs.4 Involvement of the spine causing spinal cord compression is rarely reported.1–22 A thalassemic patient with spinal EMH presenting with cord compression and paraplegia is presented.

CASE REPORT

A 17 year old Chinese male with a known history of thalassemia intermedia presented with progressive lower limb weakness over a period of three weeks, and difficulty in micturition for two days. Physical examination revealed pallor and jaundice. The spleen was enlarged 11 cm below the left costal margin. On neurological examination, bilateral lower limb weakness was elicited with power of grade 3/5. The knee and ankle reflexes were brisk. Plantar responses were upgoing. There was sensory loss to pin-prick starting from the T7 dermatome downwards. Proprioception was absent in both lower limbs. The anal tone was preserved. Examination of the upper limbs and cranial nerves was normal.

Complete blood picture yielded a haemoglobin of 8.8 gm/dl, and a haematocrit of 26.9%, with hypochromic, microcytic anaemia. Haemoglobin electrophoresis showed 49.7% HbF and 8% HbA2. Skull and chest X-rays demonstrated thinned trabeculae at the proximal rib ends,24 direct expansion from adjacent vertebral bone marrow,25 and limited mobility4 of the pericardium and lungs.3–7 Spinal EMH causing cord compression in thalassemia, first described by Gatto et al. in 1954,13 is extremely rare.1–15,17–21 A study of 138 thalassemic patients showed the notable absence of this phenomenon,23 while a recent report revealed an incidence of only 0.8%.9

A number of mechanisms have been postulated to account for the predilection for involvement of the thoracic region in spinal EMH. These include extension of EMH tissue through paraspinal veins,5–7 pericardium and lungs.6,15 and bony

DISCUSSION

The most common sites of EMH are the liver and spleen, followed by the adrenals, kidneys, lymph nodes, mediastinum, pericardium and lungs.3–7 Spinal EMH causing cord compression in thalassemia, first described by Gatto et al. in 1954,13 is extremely rare.1–15,17–21 A study of 138 thalassemic patients showed the notable absence of this phenomenon,23 while a recent report revealed an incidence of only 0.8%.9

A number of mechanisms have been postulated to account for the predilection for involvement of the thoracic region in spinal EMH. These include extension of EMH tissue through the thinned trabeculae at the proximal rib ends,24 direct expansion from adjacent vertebral bone marrow,25 and development of EMH tissue from branches of the intercostal veins.26 The narrow central canal,11,14 and limited mobility6 of the thoracic spine predisposes itself to spinal cord compression.

The diagnosis of spinal EMH is made on clinical and radiographic findings. Clinical suspicions may be raised by a history of thalassemia, and auxiliary evidence of EMH such as hepatosplenomegaly or lymphadenopathy. Plain radiographs often reveal well demarcated paraspinal masses,6,15 and bony

Fig. 1 Chest roentgenograph demonstrating expanded anterior rib ends consistent with medullary hyperplasia. A paraspinal mass is seen in the right lower zone.

OPERATION AND POSTOPERATIVE COURSE

The patient received 1000 ml of blood transfusion. His condition failed to improve and an emergency laminectomy from T6 to T7 was performed the next day. Intraoperatively, a posterior epidural vascular mass was discovered indenting the cord between T5 and T8. The lesion was easily stripped off the dura and completely excised. The diagnosis of extramedullary haemopoiesis was confirmed by histological examination of the mass.

The muscle power of the patient improved to grade 4/5 on the first postoperative day. He was ambulant with a stick after two weeks. After a month, the patient had made a full neurological recovery, and was walking independently. He was given 2000 rads of local spinal irradiation administered in ten fractions when the wound had healed. The patient received repeated blood transfusions, maintaining the haemoglobin level at 9 g/dl to suppress the extramedullary haemopoiesis. MRI of the spine performed six months after surgery showed complete resolution of cord compression, with no evidence of intraspinal EMH tissue.
Fig. 2 Preoperative sagittal MR images of the posterior epidural mass extending between T5 to T8. A marker has been placed at T11. Left: T1-weighted hypointense image without enhancement. Centre: T2-weighted hyperintense image. Right: Post-gadolinium: slight enhancement of the mass is seen. Note the cord compression from T5 to T8 levels.
Changes associated with chronic anaemia such as trabeculation, widened ribs or thickened calvaria. Bony destruction or pathological fractures are absent.

MRI is currently the gold standard for demonstrating spinal EMH. The advantages of MRI are myriad: it allows multiplanar imaging and produces superior soft tissue delineation with high sensitivity. On MRI, EMH tissue possesses signal intensity similar to that of the adjacent red marrow in the vertebral bodies. Gadolinium enhancement is minimal or absent, differentiating it from other epidual lesions such as abscesses or metastases. Being non-invasive, MRI is the ideal imaging modality for follow up assessment.

Computed tomography (CT) is a valuable investigation for patients in whom MRI is contraindicated or unavailable. CT guided needle biopsy of paraspinal masses is possible for tissue diagnosis, but the procedure carries the risk of catastrophic haemorrhage and is therefore not usually advocated. 

Fig. 3 Axial T2-weighted MR image shows the mass causing anterior compression of the spinal cord. Increased signal within the spinal cord is suggestive of oedema.

Fig. 4 Axial T1 MR images show bilateral paraspinal masses of extramedullary haematopoietic tissue. Note the widened posterior ribs representing red marrow expansion.

Radiation therapy (RT) alone has been reported to yield excellent results with neurological improvement observed as soon as 3–7 days after initiation of treatment. Haemo poetic tissue is extremely radiosensitive and undergoes shrinkage after RT, with a decrease in volume by as much as 16.4%. Dosages reported in the literature range from 900–3500 rads. A high risk of recurrence, up to 19%, is the main drawback of RT. Fortunately, these recurrences are often amenable to further RT. Tissue oedema associated with radiation can sometimes result in neurological deterioration during the initial phase of treatment, which is minimized by concomitant high dose steroid therapy. In addition to primary treatment, radiotherapy is commonly employed as a post-operative adjunct following laminectomy to reduce the likelihood of recurrence. The immunosuppressive effect of RT should be monitored with frequent peripheral blood counts as the resultant pancytopenia may further aggravate the condition.

New advances in the treatment of thalassemia include the use of drugs such as hydroxyurea, sodium butyrate and erythropoietin which boost haemoglobin levels. Patients with spinal EMH have been successfully treated with hydroxyurea alone or in conjunction with transfusion therapy. Hydroxyurea works by enhancing foetal haemoglobin production, hence reducing transfusion requirements. It is particularly applicable to thalassemic patients who are unable to receive blood transfusions due to alloimmunization. However, the benefits of hydroxyurea in spinal EMH remain to be proven.

The diagnosis of spinal EMH is suggested by a history of chronic haemolytic anaemia, evidence of EMH elsewhere, symptoms of cord compression and radiographic evidence of an intraspinal epidural lesion. A high index of suspicion with early treatment is essential to avoid irreversible neurological sequelae. The role of magnetic resonance imaging in diagnosis and follow up cannot be overemphasized. In the event of acute haemorrhage and is therefore not usually advocated.
operative radiotherapy and blood transfusion is recommended.

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Summary A case of glioblastoma with leptomeningeal spread after control of the primary lesion by radiation therapy. A discussion is made regarding leptomeningeal metastatic disease with reference to the literature. © 2002 Elsevier Science Ltd. All rights reserved.

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