Embolisation for thoracic paraspinal extramedullary haematopoiesis complicated by haemothorax: a case report

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This article was published on 2 Feb 2026 at www.hkmj.org.

This version may differ from the print version.

Hong Kong Med J 2026;32:Epub
https://doi.org/10.12809/hkmj2513218

Case presentation

A 37-year-old male with thalassaemia intermedia (alpha and beta) had undergone cholecystectomy and splenectomy in childhood, but had received no regular transfusions or medications since his haemoglobin (around 8 g/dL) and ferritin levels (approximately 4300 pmol/L) remained stable. He had multiple extramedullary haematopoietic (EMH) lesions in the bilateral paraspinal regions, evident on previous magnetic resonance imaging (Fig 1a). Following a recent viral infection in January 2025 with nasopharyngeal swab testing positive for influenza A and B and respiratory syncytial virus, he reported back pain and dark-coloured urine. Blood tests revealed a drop in haemoglobin level to 4.9 g/dL. The working diagnosis was haemolysis precipitated by infection. An initial computed tomography (CT) of the thorax revealed bilateral pleural effusions and the known EMH, but no evidence of haemorrhage (Fig 1b).

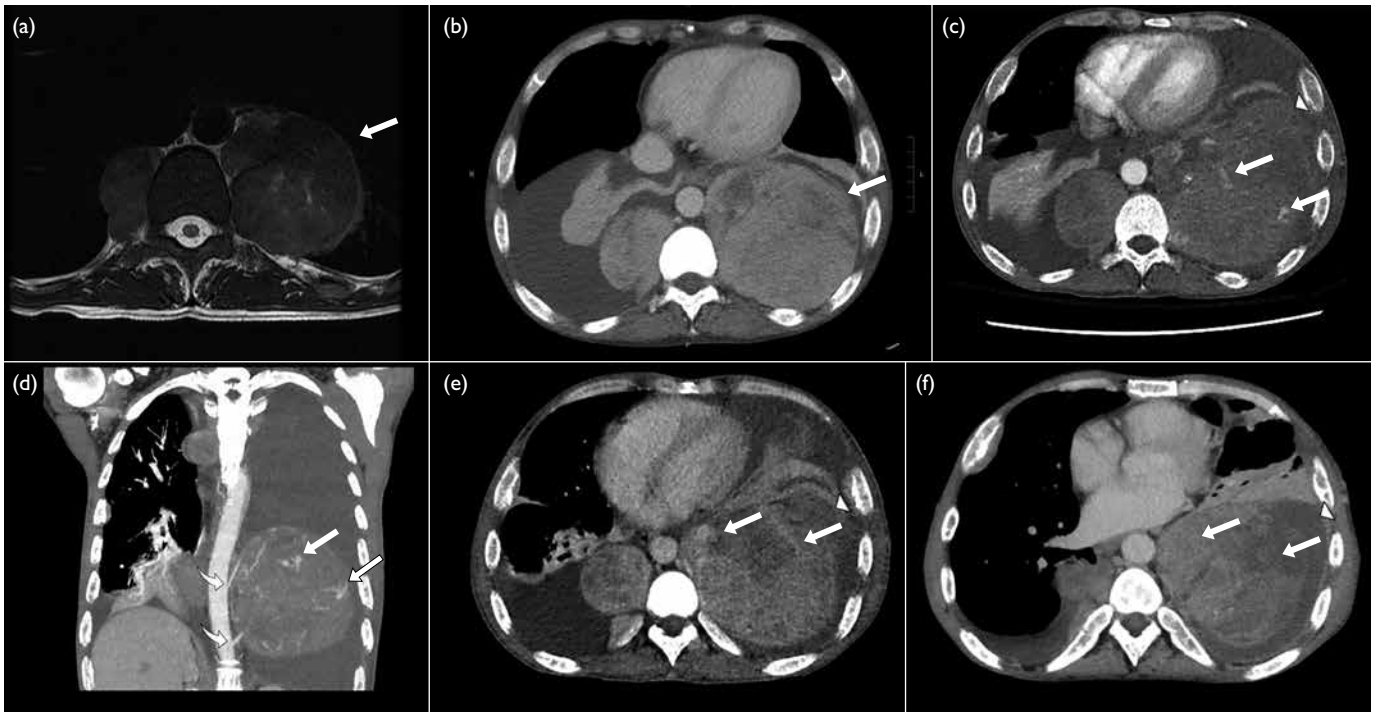

FIG 1. (a) Previous magnetic resonance imaging (MRI) of the thoracic spine of the patient in 2015. T2-weighted axial image showing multiple extramedullary haematopoiesis (EMH) in the bilateral paraspinal regions up to 8.3 cm on the left side (arrow). (b) Initial contrast-enhanced computed tomography (CECT) image in the axial portovenous phase showing bilateral pleural effusion and multiple EMH in the bilateral paraspinal regions, with the largest lesion in the left lower hemithorax up to 11.8 cm (arrow). Subsequent urgent CECT images 4 days later in (c) axial arterial phase, (d) coronal arterial phase with maximum intensity projection (MIP), and (e) axial portovenous phase showing a left haemothorax (arrowhead in [e]) and newly developed intralesional pseudoaneurysms and multiple dysplastic vessels (arrows) within the largest paraspinal EMH in the left lower hemithorax, indicating active bleeding. The MIP image enabled identification of the origin of the left intercostal arteries for preoperative planning (curved arrows in [d]). (f) Post-embolisation follow-up CECT image at 2 weeks in axial portovenous phase showed decreased vascularity of the left lower thoracic EMH (arrows) and low-density effusion, and reduction in haemothorax (arrowhead)

A few days later, the patient developed sudden chest pain, with tachycardia and hypotension (blood pressure: 82/43 mm Hg). Urgent CT of the thorax revealed a left haemothorax and blood products adjacent to the largest paraspinal EMH in the left lower hemithorax, along with new intralesional pseudoaneurysms and multiple dysplastic vessels, indicative of active bleeding (Fig 1c-e). A left chest drain was placed, yielding 1.3 L of heavily blood-stained fluid. He was referred to interventional radiologists for urgent embolisation to control the bleeding.

Urgent embolisation was performed under local anaesthesia. A 5-Fr Mikaelsson catheter (Merit Medical, South Jordan [UT], United States) was inserted via transfemoral access to catheterise the left lower intercostal arteries. Digital subtraction angiography revealed abnormal, tortuous vessels with small pseudoaneurysms arising from the left 10th and 11th intercostal arteries and supplying the dominant left lower thoracic EMH (Fig 2a and b). Selective cannulation of these arteries was performed using a 2.1-Fr Maestro microcatheter (Merit Medical). Superselective embolisation was then performed at several branches using a combination of 700-900 μm Embosphere (Merit Medical) and 710-1000 μm EGgel (ENGAIN, Hwaseong-si, South Korea). A postprocedural angiogram showed successful devascularisation of the lesion and obliteration of the pseudoaneurysms (Fig 2c and d).

Following the procedure, the patient's vital signs normalised and there were no neurological deficits. His haemoglobin level stabilised at 7 to 8 g/dL and chest drain was later removed due to minimal output. Follow-up CT 2 weeks later showed a reduction in the left haemothorax and decreased vascularity of the left lower thoracic EMH (Fig 1f). The patient was discharged and remains asymptomatic to date, with no clinical evidence of re-bleeding.

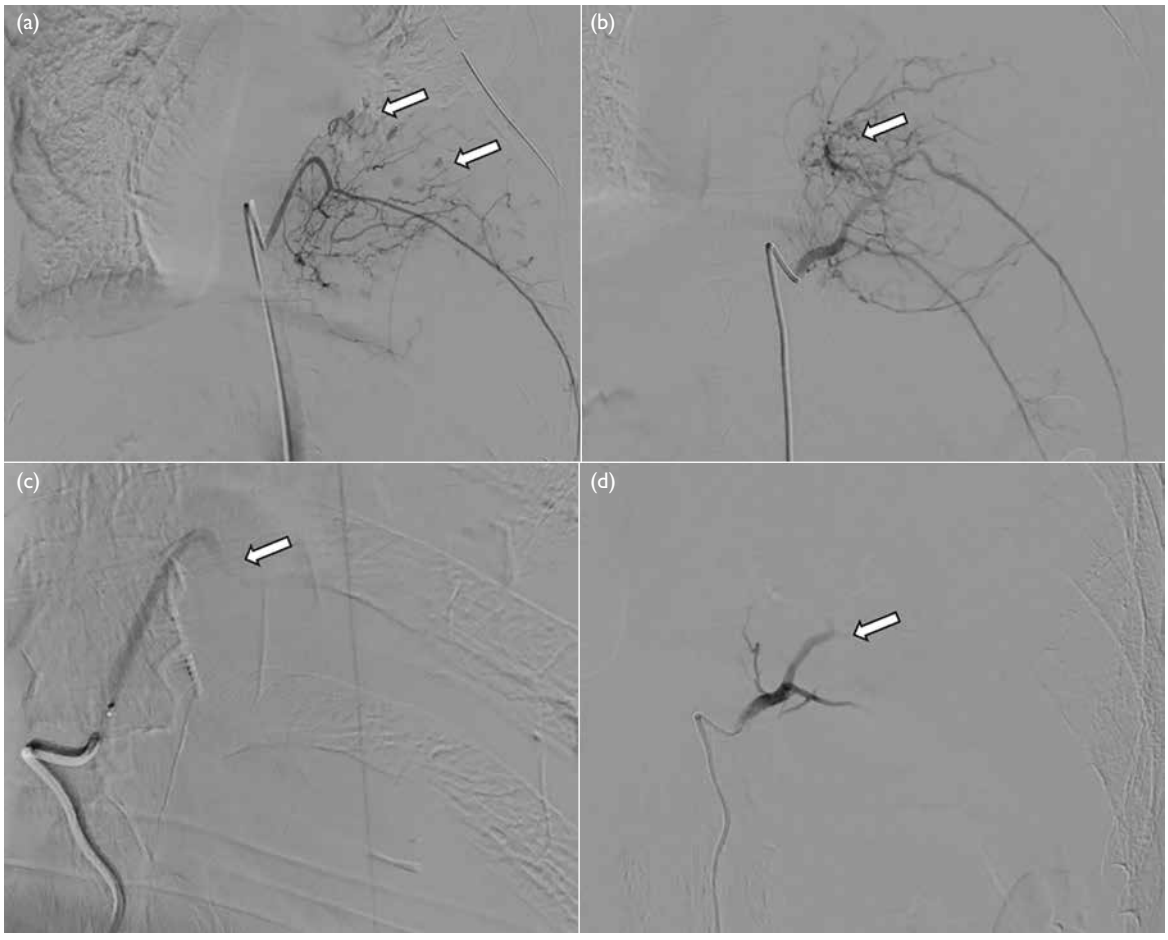

FIG 2. (a, b) Digital subtraction angiography (DSA) of the patient showing abnormal vessels with multiple pseudoaneurysms (arrows) arising from the left 10th (a) and 11th (b) intercostal arteries. Superselection of the supplying branches and embolisation were then performed. (c, d) Post-embolisation DSA showing successful devascularisation and obliteration of the pseudoaneurysms (arrows) arising from the left 10th (c) and 11th (d) intercostal arteries

Discussion

Extramedullary haematopoiesis refers to the compensatory production of blood cells outside of the bone marrow, typically occurring in patients with insufficient bone marrow function, such as those with thalassaemia. Diagnosis can be made clinically and radiologically, especially when the lesions are multifocal or bilateral, exhibiting characteristic iron deposition or fatty replacement on imaging.[1] Paraspinal EMH can lead to complications such as spinal cord compression or, rarely, haemothorax due to rupture and bleeding into the pleural cavity. In our patient, it was hypothesised that haemolysis from the recent infection increased the demand for haematopoiesis, stimulating the existing EMH to recruit additional blood vessels under stress. This angiogenesis ultimately led to intralesional bleeding, pseudoaneurysm formation and haemothorax.

There are no established evidence-based guidelines for the treatment of EMH. Management depends on lesion size and location, as well as the patient's clinical condition.[2] In uncomplicated cases, hypertransfusions aimed at correcting anaemia and reducing haematopoietic demand can shrink EMH lesions. Radiotherapy may also be used, as haematopoietic tissue is radiosensitive and tends to regress following irradiation. Nonetheless, when complications such as haemorrhage arise, more urgent intervention is needed. Thoracotomy with surgical excision has traditionally been performed, but emergency surgery carries higher risks of bleeding and other complications.[3] Embolisation has emerged as a mainstay treatment for many haemorrhagic conditions due to its versatility and precision. Our case demonstrated its viability in EMH-related haemorrhage, enabling accurate identification of bleeding vessels and prompt haemostasis while minimising the risks of more invasive surgery.

To ensure a safe and effective embolisation, meticulous planning and identification of the target vessels are essential, including superselective cannulation to prevent non-target embolisation. Spinal cord feeders can arise from intercostal arteries and are identified by their characteristic hairpin appearance as they course medially to the vertebral pedicle.[4] In particular, the artery of Adamkiewicz, the largest anterior medullary branch to the anterior spinal artery, commonly arises at left-sided T9 to T12 levels. Reflux into these arteries can lead to spinal cord ischaemia. A balance must be struck between complete devascularisation of the lesion and the risk of non-target embolisation. Larger embolic agents, such as particles larger than 350 μm, are theoretically safer as they are too large to enter the small-calibre spinal arteries. Embolic agents should be injected slowly under fluoroscopic guidance, with close monitoring for any interval appearance of spinal artery supply or reflux.

The choice of embolic agents is important and depends on factors such as the location of target vessels, proximity to vital structures, and operator experience. In our case, a combination of permanent and temporary particulates was used to achieve haemostasis. Embospheres are non-absorbable, calibrated microspheres available in various sizes. The 700-900 μm size was chosen to prevent entry into spinal arteries. These provide a long-term embolic effect with predictable delivery.[5] EGgel (710-1000 μm), a porcine-derived gelatin microparticle, was used for further proximal embolisation. It offers temporary embolisation, complementing Embospheres by preventing vessel recanalisation under high intraluminal pressure.

Haemorrhage associated with EMH is a critical condition requiring prompt and effective intervention. Embolisation can be life-saving in such cases. Although further studies are needed to assess long-term outcomes, embolisation should be considered part of the multidisciplinary management of patients with EMH.

Author contributions

Concept or design: KH Chu, L Xu.
Acquisition of data: KH Chu, L Xu.
Analysis or interpretation of data: KH Chu, L Xu.
Drafting of the manuscript: KH Chu, L Xu.
Critical revision of the manuscript for important intellectual content: All authors.

All authors had full access to the data, contributed to the study, approved the final version for publication, and take responsibility for its accuracy and integrity.

Conflicts of interest

All authors have disclosed no conflicts of interest.

Funding/support

This study received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

Ethics approval

This study was approved by the Central Institutional Review Board of Hospital Authority, Hong Kong (Ref No.: CIRB-2025-064-2). The patient provided written informed consent for all treatments and procedures, and for publication of the case report, including the accompanying clinical images.

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