

CASE REPORT

Kasabach-Merritt syndrome in an infant with cavernous haemangioma

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ABSTRACT

Kasabach-Merritt syndrome (KMS) is a potentially life-threatening consumptive coagulopathy associated with vascular malformations, whereas haemangiomas typically present in infancy, with rapid growth, thoracic location, and complicated clinical course demanding chemotherapy and radiotherapy have rarely been reported. We describe a case of a female infant with cavernous haemangioma of the right chest wall spreading to the pleural space and diaphragm, and complicated by KMS. Our patient presented an inadequate response to treatment with systemic corticosteroids, propranolol, and vincristine. Partial tumour regression and diminution of trapping of platelets in the tumour were achieved after radiotherapy only. The purpose of this report is to increase awareness about KMS, to illustrate the treatment challenges and to provide a basis for clinical decision-making in this rare, life-threatening condition.

KEY WORDS:

Kasabach-Merritt syndrome, cavernous haemangioma, infant, management.

INTRODUCTION

Cavernous haemangiomas (CH) are histologically benign and have local growth without the potential for metastasis. They may be clinically manifest or asymptomatic and appear during the second to third weeks of life as bluish, pink, or reddish subcutaneous lesions of any shape that may rapidly increase in size. Although benign, CH can have aggressive local growth and result in life-threatening Kasabach-Merritt syndrome (KMS) [1]. KMS is characterised by profound thrombocytopenia, microangiopathic haemolytic anaemia, and consumptive coagulopathy in the setting of a rapidly enlarging vascular tumour. The risk of KMS is greater with increased depth and infiltration of the vascular tumour and with retroperitoneal or intrathoracic involvement [2]. The aims of treatment of KMS are twofold: involution of the tumour and correction of the

consumptive coagulopathy. Herein, we report on an infant with KMS and provide a literature review of similar cases.

CASE REPORT

A three-month-old female infant was admitted to the Emergency Department because of a two-hour history of lethargy and a large area of dark red discoloration of her skin on the abdomen and back. The child's parents noticed firm, purpuric coloured swelling on the right side of the chest, which rapidly increased in size from 2 to 10 cm within one day (Fig. 1). The lesion was not present at birth and appeared as a small red spot observed by the mother at around the age of one month. The medical history was otherwise unremarkable; in particular, trauma, bleeding manifestations, fever, seizures, and any other acute illnesses were absent. No prior therapy was given.

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FIGURE 1. A 3-month-old female baby with cavernous haemangioma involving the right side of the chest prior to admission



FIGURE 2. The patient on the 3rd day after admission (right side)



FIGURE 3. The patient on the 3rd day after admission (back side)

At admission, the physical exam revealed an asymmetric massive bruise in the right lateral thoracoabdominal region spreading to the back and a well-bordered tumour mass 10 cm × 8 cm in size with erythematous appearance, firm consistency, and normal local temperature (Figs. 2 and 3). The liver was palpable 3 cm below the costal margin (liver span 8.8 cm), and the spleen was not palpable. The child did not have any other congenital malformation. Cardiovascular system examination results were normal. Respiratory system examination revealed decreased breathing sounds over the right lung. A plain chest X-ray revealed pleural effusion and compressed right lung (Fig. 4). The complete blood counts at admission revealed haemoglobin of 90 g/l, white blood cells of $6.5 \times 10^9/l$, platelet counts of $40 \times 10^9/l$, prothrombin time of 15.3 seconds, and partial thromboplastin time of 37 seconds.

Computed tomography (CT) scan of the chest with intravenous contrast revealed tangled blood vessel masses of about 3.3 cm × 1.1 cm × 3.0 cm in the subcutaneous tissue of the right lateral chest wall with spread to the 9th–11th intercostal spaces (2.2 cm × 1.2 cm × 2.6 cm), indicating that the mass could be a haemangioma. The haemangioma was supplied by the right lateral thoracic artery and the 8th, 9th, and 10th intercostal arteries. The extravasation of the contrast agent was not demonstrated. CT also demonstrated a pleural effusion (150 ml) with compressed right lung parenchyma and lateral thoracic and abdominal wall muscle infiltration by the haemangioma. In the context of thrombocytopenia, coagulopathy, and right-sided thoracic cavernous haemangioma, the patient was diagnosed with KMS. She received prednisone (1 mg/kg), propranolol (2 mg/kg), fresh frozen plasma, platelet transfusion, and chest tube placement. Due to progressive coagulopathy despite all the above treatments, we added intravenous vincristine at a dose of 0.05 mg/kg/week. The response to four doses of vincristine was poor. Magnetic resonance

imaging (MRI) revealed a further increase in the size of the haemangioma (about 5.7 cm × 7.4 cm × 3.5 cm). The next step of the treatment was radiotherapy – a total of four sessions with a total dose of 8 Gy in single-fraction doses of 1 Gy. After the second session, the haemangioma slowly diminished in size. A follow-up MRI performed three months later revealed a further reduction of the tumour mass (tumour volume of 28 cm³ compared to the initial tumour volume of 102 cm³). Currently, the girl is under the constant care of oncological and haematological counselling, and the coagulopathy subsided and never recurred after the tumour size was reduced.

DISCUSSION

Cavernous haemangiomas (CH) are non-infiltrative, low-flow hamartomas that are usually thought to be be-



FIGURE 4. Chest X-ray revealed pleural effusion and compressed lung in the right side

nign [3]. CH are frequently located in the liver, skin, and subcutaneous tissues, and some have rare locations [4]. Less than 1% of all haemangiomas are deep-seated, such as intramuscular haemangiomas [5]. Although the CH is benign and composed of haphazardly arranged vascular tissue, life-threatening complications have been reported in many cases [2, 3, 6–8]. The exact mechanisms that control the involution of haemangiomas are poorly understood. However, the progressive nature of the disorder with some features associated with the patient's growth makes the pathogenic mechanisms age dependent. In some cases, these haemangiomas do not respond to steroids, radiation therapy, cytotoxic drugs, or embolisation [6]. Occasionally it can endanger vital structures and is associated with consumption coagulopathy and thrombocytopenia, known as KMS [9]. KMS usually develops in infancy, and it is usually associated with kaposiform haemangioendothelioma and tufted angioma, rather than the classic haemangioma of infancy [10]. It is not clear if there is any linear relation to the size of the haemangioma and the initiation of KMS, but most of the KMS cases are reported in giant haemangiomas [11]. Whether a specific organ system (or site) which harbours the haemangioma confers increased predilection towards initiating KMS is also unclear [12]. On reviewing the literature, a wait-and-see strategy is mainly indicated in stable haemangiomas in non-vital sites, without significant impact on appearance and function [9]. The treatment of KMS in the case of CH is very challenging and involves a two-pronged approach that includes supporting and stabilising haemostasis while trying to remove or ablate the lesion. Management of coagulopathy and supportive care consists of judicious use of platelet transfusion [13], sparing and limited correction of hypofibrinogenaemia and coagulopathy using cryoprecipitate and fresh frozen plasma. However, Wang and Li reported that transfused platelets can release pro-angiogenic growth factors and may stimulate endothelial proliferation and contribute to the late response of vincristine [14]. Corticosteroids are the commonly accepted first-line treatment, but satisfactory results are reported in only 30% of cases of KMS [15]. Although the mechanisms of steroid therapy are unclear, prednisone appears to increase vasoconstriction, inhibit fibrinolysis (by inhibiting the production of tissue plasminogen activators and increasing the plasminogen activator inhibitors), increase platelet longevity, and disrupt angiogenesis [8]. If no response is seen within a week or two after starting the therapy, then either the dose is increased or alternative therapy is recommended [12]. In other case reports, the authors successfully used orally administered propranolol as monotherapy or in combination with other therapeutic modalities [16–19] with rapidly replaced systemic corticosteroids as first-line therapy for complicated haemangiomas of infancy [20, 21]. There are case reports of successful treatment of KMS with vin-

cristine and interferon α [6, 9]. Tumour eradication can be achieved by different techniques: surgery, vascular embolisation, and radiation. Zheng *et al.* found laser therapy to be unsuitable for the management of deep-seated haemangiomas and rarely used today because of the high incidence of scar formation and poor effects [22]. Fawcett *et al.* described vascular tumour regression after direct intralesional injection of absolute ethanol. This method is considered to be a simple and reliable alternative treatment for KMS among infants [15]. The use of radiation therapy has also been reported in KMS. However, radiation may have long-term complications, including growth arrest, developmental delay, and secondary malignancies, and should be used with caution in younger patients [22]. Despite the advent of improved imaging and treatment modalities, the cure rate remains suboptimal for most types of vascular malformations. Moreover, long-term relief of symptoms and tumour shrinkage in the majority of patients treated with radiotherapy for large unresectable haemangiomas [23, 24] and for life-threatening haemangiomas was confirmed [25]. Master *et al.* recommended a combination of vincristine and radiation therapy along with supportive care in very symptomatic patients or in cases associated with severe thrombocytopenia, as an effective initial approach [9]. Some authors have suggested stepwise and individual models for the treatment of KMS in children.

CONCLUSIONS

Although basic diagnostic criteria for KMS are well known, the management is very challenging because of its rarity and unstandardised therapeutic strategies. Many potent chemotherapeutic agents and approaches can be used, but the response is variable and not always predictable. Considering the fact that the treatment of KMS is still empirical, it is extremely important to publish individual experiences in the management of this life-threatening syndrome. The use of interventional radiology guided therapies has been described with diverse clinical benefits. Nevertheless, in our case radiotherapy proved to be an effective treatment for KMS associated with cavernous haemangioma.

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DISCLOSURE

The authors declare no conflict of interest.

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