TRANSFUSION MEDICINE
Official Journal of the British Blood Transfusion Society
British Blood Transfusion Society
Transfusion Medicine | LETTER TO THE EDITOR

Autotransfusion for a haemothorax complicating an *Echis pyramidum* envenomation in Republic of Djibouti

Dear Sir,

In sub-Saharan Africa, snake bites account for 7–20,000 deaths each year as they are common in areas lacking modern medical facilities (Chippaux, 2011). In the Republic of Djibouti, snake envenoming is mostly because of *Echis pyramidum*, a Viperidae indigenous to North, Central and Eastern sub-Saharan Africa. The clinical picture is characterised by a local syndrome, with pain, swelling and sometimes necrosis, and a haemorrhagic syndrome caused by a complex coagulopathy (Mion *et al.*, 2013). Epistaxis, haemoptysis and conjunctival haemorrhage are common bleeding manifestations. In West Africa severe cases of envenoming by *Echis ocellatus* led to haemorrhagic shock and intra-cerebral haemorrhage (Warrell *et al.*, 1977). Here, we present an original management of a haemothorax complicating a snake envenomation in Africa using both antivenom and reinfusion of autologous blood using a cell saver.

A 25-year-old man was admitted to the French Military Hospital in Djibouti 5 days after a snake bite on his left foot. On admission, the patient was conscious with slight drowsiness (Glasgow Coma Scale = 14). He reported intense local pain. Other that the recent snake bite, there was no significant past medical history. Physical examination of the foot revealed local swelling with bluish discolouration and minimal local bleeding. Despite there being no other external bleeding, the patient had signs of hypovolemic shock: cutaneous pallor, hypotension (blood pressure 90/58 mmHg), tachycardia (120 beats per min) and tachypnoea (25 breaths per min). Breathing sounds had decreased on the right side, with dullness to percussion. The rest of the physical examination was normal. Biological tests showed a profound anaemia (haemoglobin: 34 g L^{-1}), with mild thrombocytopenia (platelets: 113×10^9 L^{-1}) and a severe coagulopathy (prothrombin time > 69 s, activated partial thromboplastin time > 62 s and no detectable fibrinogen). The creatinine concentration was normal. Ultrasonography revealed a massive right haemothorax, which was confirmed by a chest X-ray (Fig. 1a). Given the description and the localisation of the snake (a beige snake in a desert biotope) and the associated clinical and biological presentation, it was assumed that envenomation had been caused by *E. pyramidum*.

Two vials of polyvalent antivenom efficient against *Echis, Bitis, Naja* and *Dendroaspis* venoms (FAV-Afrique®, Sanofi-Pasteur, Lyon, France) were administered on admission, and two packs of red blood cells were immediately transfused. Because of the persistence of the coagulopathy 5 h later (prothrombin time: 32 s, activated partial thromboplastin time: 48 s and fibrinogen: 0·6 g L^{-1}), a third vial of FAV-Afrique was administered. Despite the coagulopathy, and the patient facing severe dyspnoea, a decision was made to insert a chest tube. An autotransfusion was planned because of the significant quantity of blood (5·2 L) and the limited blood resources of the hospital. The collected blood was filtered, washed and concentrated with a HAEMOLITE 2 + ® cell-saver system (Haemonetics, Glasgow, UK); 1·2 L of concentrated autologous blood was obtained and transfused to the patient. The subsequent blood tests confirmed the efficacy of the transfusion (haemoglobin: 90 g L^{-1} at after 6 h). Normalisation of haemostasis occurred within 36 h (prothrombin time: 16 s, activated partial thromboplastin time: 28 s

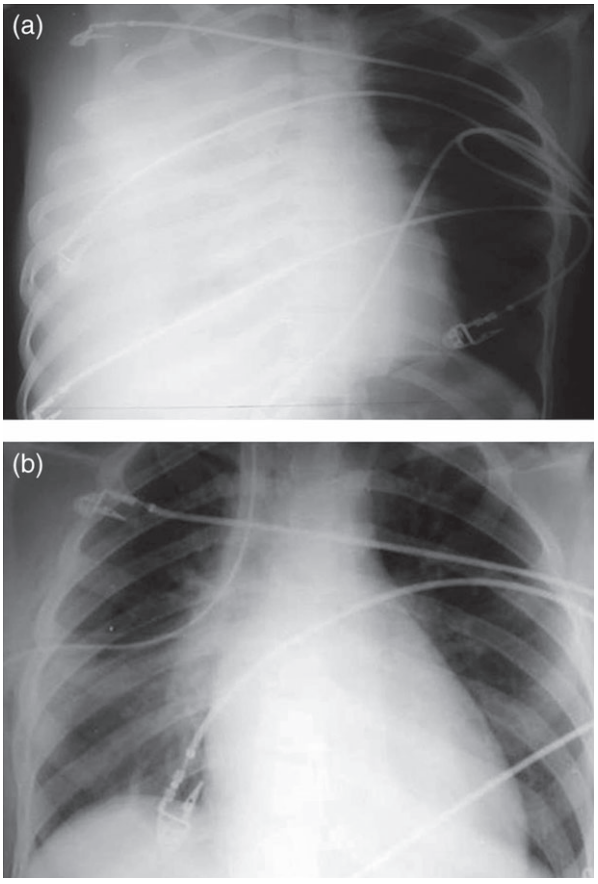

Fig. 1. Complete right haemothorax complicating *Echis pyramidum* envenomation (a) and normal chest X-ray at day 7 after removing the chest tube (b).

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doi: 10.1111/tme.12400

and fibrinogen: 3·9 g/L), with no recurrence of the haemothorax. The chest tube was removed on the seventh day, and the patient was discharged 48 h later with a normal chest X-ray (Fig. 1b).

Intracavitary haemorrhages (haemothorax, haemopericardium, haemoperitoneum) are serious complications rarely described after snakebite (Lakhotia *et al.*, 2002; Senthilkumaran *et al.*, 2012; Singh *et al.*, 2012). Previously, only two cases of haemothorax complicating an *Echis* bite have been reported, both because of *Echis carinatus* bites in India (Lakhotia *et al.*, 2002; Singh *et al.*, 2012). These Intracavitary haemorrhages were not associated with external bleeding and occurred either early after the bite or after 2–5 days. Here, no other cause (such as tuberculous cavity or chest wall trauma) was identified according to the history or chest X-ray of the patient. *Echis* venoms interact with different steps of haemostasis; the combination of snake toxins, which alter vascular endothelium and several enzymes, interfere with platelets, and multiple clotting factors II, X and XIII are responsible for the complex coagulopathy that caused this haemothorax (Berling and Isbister, 2015). The coagulopathy preceded or was concurrent with the clinical picture of bleeding.

Antivenom remains the cornerstone of the treatment of snake envenomation and restores haemostasis within a few hours by inactivating enzymatic activity of the venom (Mion *et al.*, 2013). Antivenom was administered here despite the late presentation (5 days) of the patient because the effectiveness of antivenom has been previously demonstrated regardless of the delay of administration in *Echis* bites (Larréché *et al.*, 2011). The decision to inject a half dose of antivenom (one vial) for further treatment was driven by the context of antivenom shortage and the subsequent supply difficulties. However, the kinetics of haemostasis normalisation was consistent with previous studies performed with FAV-Afrique in Djibouti (Mion *et al.*, 2013) and Cameroon (Chippaux *et al.*, 1998).

The decision to insert a chest tube was a difficult one; this invasive and potentially dangerous treatment could have aggravated the importance of the intracavity bleeding or could have even been complicated by a supplementary external bleeding (in case of lesion of an intercostal vessel). The decision was prompted because of the importance of the haemothorax (later confirmed by the obtained 5 L of salvaged blood) and the consecutive dyspnoea.

Our case report shows how a cell-saver system can dramatically reduce the need for homologous red blood cells. Here, despite tremendous blood less, only 2 U of red cells had to be transfused, in contrast with the haemothorax case reported by Singh *et al.* (2012), which required the administration of eight red cell units. Besides the lack of availability in African hospitals, the main limitation of cell savage is its absence of efficiency for the treatment of the coagulopathy because the salvaged blood is completely devoid of platelets and clotting factors. A study of the salvaged blood would indeed have been of interest, but the context of African practice precluded the verification that the cell-saver system had completely removed all venom compounds. In any case, previous reports have validated the fact that cell-saver systems were able to remove haemostatic proteins from the salvaged blood (Bernstein *et al.*, 1997).

In conclusion, this first case report of an Intracavitary bleeding occurring after a snakebite in Africa illustrates the rare occurrence of an uncommon life-threatening complication, previously only reported in Asia. Despite inherent limitations, cell savage can reduce the number of red cell units transfused in the context of limited blood supply while keeping in mind that antivenom always remains the cornerstone of treatment in snakebite-related coagulopathy.

ACKNOWLEDGMENTS

F. P. and M. P. performed the research. F. X. J., S. L. and G. M. wrote the paper. The authors are indebted to Mr Steve Bourne for his kind reviewing of the manuscript.

CONFLICT OF INTEREST

The authors have no competing interests.

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