CASE REPORT

Late Care in Marathon Runs Leading to Exertional Heat Stroke with Multiple Organ Failure

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Abstract

Background: **Exertional heat stroke (EHS) is still a main cause of death in sport. Many of EHS complications could have been prevented if EHS had been recognized and treated early and properly.**

Case presentation: **We report an unusual case of multiple organ failure caused by EHS due to intensive sportive activities in a hot environment with lack of primary care. A 35-year-old healthy sportive man was admitted in our hospital because of muscle aches and weakness as well as dark urine three days after a six hour marathon run (Agadir Semi-Marathon) in a very sunny day. Patient developed rhabdomyolysis, acute renal failure (ARF) requiring hemodialysis because of hyperkaliémia, azotémia and severe metabolic acidosis, disseminated intravascular coagulation and acute liver failure. Unfortunately, after eight days of intensive care, the patient died from septic shock and multiple organ failure.**

Conclusion: **This case reminds us that, despite the advancements of knowledge in the area of EHS prevention, recognition, and treatment, knowledge has not been translated into practice.**

Key Words: Heat Stroke; Rhabdomyolysis; Acute Kidney Injury; Multiple Organ Failure

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INTRODUCTION

Exertional heat stroke (EHS) is a potentially life-threatening disorder characterized by an elevated core body temperature above 40°C with neurologic dysfunction; the disease spectrum can include involvement of multiple organs to varying degrees [1]. The epidemiological data of EHS is not well known, because many cases are not diagnosed at the appropriate time; however EHS is considered to be the second leading cause of death in athletes. Lack of primary care in this context could be dangerous, because many fatal courses could be prevented if EHS were recognized early and treated properly [2].

CASE REPORT

A healthy 35-year-old Moroccan sportsman presented to the emergency department three days after participating to the marathon of Agadir (first edition; April the 21st 2013). The patient had no particular personal or familial history and he was a regular sportive for three years, running 10 to 20 kilometres a week in approximately 3 to 4 hours, he participated in five marathons in Morocco without data of personal best time. Poor clinical data related to what happened on the race day was available at admission except the notion of being found unconscious and feverish after a six hour marathon race on a very hot

Table 1: Evolution of laboratory data during admission to the intensive care unit

DAYS	Admission day	day 2	day 3	day 4	day 5	day 6	day 7	day 8
White Blood Cells (number/mm3)	9800	8700	12910	13090	16090	26260	21020	18520
Hemoglobin (g/dl)	13.4	12	13.1	12.1	10.6	11.2	10.5	11.3
Platelets (x1000/mm3)	70	75	86	95	112	197	210	202
Prothrombin Ratio (%)	12	22	25	35	48	42	50	54
Sodium (mmol/l)	117	123	122	127	135	132	130	131
Potassium (mmol/l)	7.15	5.25	5.45	4.87	3.68	4.2	4.18	4.56
Urea nitrogen (g/l)	1.17	1.36	1.35	1.68	1.15	1.56	2.27	1.55
Serum creatinine (mg/l)	110	89.3	87.9	99.1	67.4	56.8	52.6	35.6
Calcium, total (mg/l)	56	-	65	-	74	-	81	79
Creatine phosphokinase (IU/l)	40175	91596	85020	75200	42560	45250	35400	22300
C-Reactive Protein (mg/l)	9.06	-	19.42	-	32	-	68	72

and humid day (temperature at race departure 41°C, humidity 64%). Diffuse muscle aches and dark urine was noted. No other significant medical and surgical history was reported and there was no symptoms of intercurrent infection. The patient did not take any drugs or herbal products. He did not smoke or drink alcohol and there were no metabolic, neuromuscular and autoimmune diseases in his family. Clinical review on arrival in the emergency department showed the patient's blood pressure was 74/48 mm Hg, heart rate was 90 beats/min and regular, temperature was 37.8°C, respiratory rate was 27 breaths/ min and his general physical examination was normal except leg muscle tenderness on palpation.

Laboratory data, presented in table 1 and figure 1, showed, from the admission day, acute hepatic and renal failure, rhabdomyolysis and disseminated intravascular coagulation following EHS. There was no abnormal finding on the chest X-ray but nuclear magnetic resonance of leg's muscles showed an intensive rhabdomyolysis (Fig. 2).

No cooling treatment was performed because body cooling unit was not available and the rectal temperature did not exceed 38 C at admission. From the first hours of admission, intensive care was performed with vigorous intravenous fluid infusion, (3 litres per day of saline and glucose serum) in addition to sodium bicarbonate (1 litre per day), intravenous nutrition [oliclinomel ® 1 litre per day], anticoagulation with enoxaparin daily subcutaneous injection [4000 IU] and daily heamodialysis for azoteamia, hyperkalieamia and metabolic acidosis 3

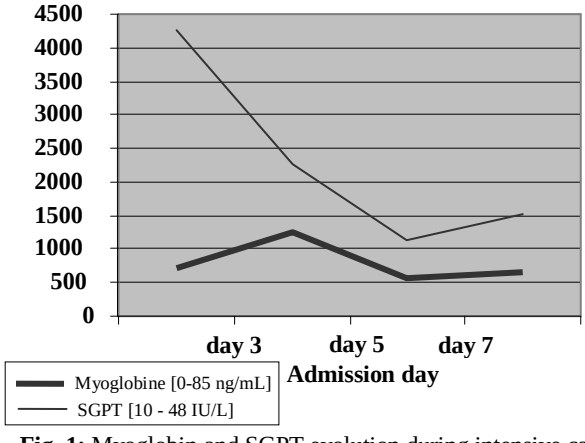

Fig. 1: Myoglobin and SGPT evolution during intensive care
SGPT: Serum glutamic-pyruvic transaminase

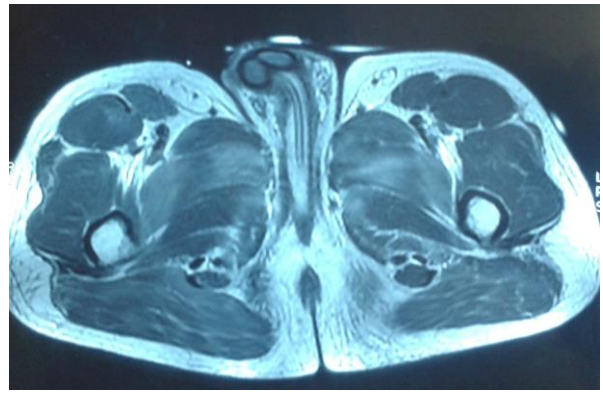

Fig. 2: T2 weighted axial MRI of the thighs. Bilateral homogeneous high intensity signal from muscles reflecting rhabdomyolysis

hours with mean ultrafiltration of 750 ml and mean Kt/v = 1.1. Antibiotherapy by ciprofloxacine 400 mg daily and amoxicillin and clavulanic acid 1 g/125 mg thrice a day, for urinary tract infection. Unfortunately, after 08 days of intensive care, the patient died from septic shock and multiple organ failure.

DISCUSSION

EHS is one of the leading causes of death among athletes and requires immediate admission to an intensive care unit [1,2]. The absence of initial care worsens the prognosis. The progression to multiple organ dysfunction can be fatal as many organ systems may be affected [3]. Pathogenetic mechanisms of tissue injury are not clear.

The clinical manifestations of heat stroke are variable. Neurological dysfunction is invariably present and other complications that fall within the category of multiorgan dysfunction syndrome such as rhabdomyolysis, acute renal failure, hepatic failure, and disseminated intravascular coagulation can be life threatening [4].

Many athletes who experience EHS have fatal outcomes. The main error in care of this serious injury comes from misdiagnosis and delayed treatment with respect to the concept of ‘‘cool first, transport second’’. This reminds us that, despite the advancements of knowledge in the area of EHS prevention, recognition, and treatment, knowledge has not been translated into practice[2,3]. Several reports have shown that decreasing the core body temperature to less than 38.9 °C within 30 min of presentation could improve survival [6].

We report here an unusual case of multiple organ dysfunction syndrome leading to hepatic failure, acute renal failure and disseminated intravascular coagulation following an EHS caused by an intense physical activity with lack of primary care during the first two days. Unfortunately, the reason for the delayed treatment is still unclear. Maybe the medical logistic unit the event organiser was not sufficient enough.

CONCLUSION

In Morocco, marathon running is very popular and happens in a hot and humid climate, the medical logistic is very important in this context. This case reminds us that, despite the advancements of knowledge in the area of EHS prevention, recognition, and treatment, knowledge has not been translated into practice.

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