J R Coll Physicians Edinb 2016; 46: 241–3
http://dx.doi.org/10.4997/JRCPE.2016.406

Dengue fever with compartment syndrome of the right arm

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ABSTRACT A 44-year-old woman was admitted to our hospital with dengue fever. She developed a haematoma in the right arm at the site of a previous arterial line insertion. Due to coexisting thrombocytopenia, the bleeding was severe enough to cause compartment syndrome. An emergency fasciotomy was performed and her limb salvaged. The case illustrates one important potential complication of this common infectious disease.

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KEYWORDS compartment syndrome, dengue fever, emergency fasciotomy

DECLARATION OF INTERESTS No conflict of interest declared

INTRODUCTION

Compartment syndrome involving the limb as a complication of dengue fever is very rare and we have only found one case reported in the international literature.[1] We report this case to underline its importance as a serious bleeding complication due to dengue fever.

CASE PRESENTATION

A 44-year-old Chinese Malaysian woman presented to the Emergency Department with a 5-day history of fever, headache, myalgia, arthralgia and reduced oral intake. Her physical examination on arrival was unremarkable with no signs of plasma leakage. Vital signs were stable with good urine output. Her initial blood investigations revealed a classic dengue fever picture with white blood cells 1.7 x 10^9/L, platelets 28 x 10^9/L, haemoglobin 14.4 g/dL, haematocrit 40.5%, albumin 35g/L, alanine transaminase 131 U/L, aspartate transaminase 250 U/L and activated partial thromboplastin time prolonged at 62 seconds. Both dengue non-structural protein-1 (NS1 antigen) and dengue IgM were positive. Renal profile, prothrombin time and other investigations were normal. Blood films for malarial parasites were repeatedly negative. The patient took amlodipine 5 mg once daily for hypertension and was not on any anticoagulant medications. She was subsequently admitted to the dengue ward.

She developed plasma leakage (bilateral pleural effusion and ascites) on day 2 of admission (day 6 of illness). Her lactate rose to 4.3 mmol/L, with haemoglobin 16.8 g/dL, haematocrit 47.7%, white blood cell count of 4.4 x 109/L and platelets falling to 7 x 10^9/L. In view of these complications, she was transferred to the High Dependency Unit for management and close monitoring.

She remained haemodynamically stable in the High Dependency Unit. On day 8 of her illness (in recovery phase), we noticed that the bruises on her right arm (at the site of a now-removed arterial line) continued to expand. Her right arm was swollen and tense but the distal circulation and sensation were still intact. Ultrasound of the right arm was performed with findings suggestive of a right upper limb haematoma; no evidence of active arterial bleeding was seen. Her haemoglobin and platelets were 11.2 g/dL and 30 x 10^9/L, respectively, at that time. After review by the orthopaedic team, an emergency fasciotomy was planned for compartment syndrome of the right arm.

A 20 cm incision was made over the anterolateral aspect of the right arm releasing the fascia, all intermuscular septae and the anterior compartment. Intra-operative findings revealed a haematoma and a tense, swollen right arm. The biceps brachii muscle appeared dark and dusky.

The patient remained stable on the orthopaedic ward and was discharged 6 days after the fasciotomy (Fig. 1). She developed no other complications during her hospital stay. Upon discharge, her blood investigations revealed haemoglobin 11.2 g/dL, haematocrit 32.5%, white blood cell count 6.8 x 10^9/L and platelets 125 x 10^9/L. The patient has remained well since.

DISCUSSION

Dengue fever remains a major public health concern in Malaysia with an exponential growth in dengue fatalities.

TABLE 1 Differences in compartment syndrome between two cases of dengue fever.

	Khoo et al.	**Bandyopadhyay et al.**[1]
Time of onset	Day 8 of illness	Day 3 of illness
Gender	Female	Male
Recent history of local trauma	Arterial line insertion	No
Location	Right arm	Right forearm
Other sites of leaking	Pleural effusion, ascites	None
Other bleeding sites	None	Gum bleed
Pathophysiology	Haematoma increasing intra-compartmental pressure	Capillary leak syndrome leading to fluid leakage from intravascular to interstitial space

At the time of preparing this case report, 38,667 cases of dengue fever have been reported and 117 patients have died due to dengue fever in Malaysia.[2] Clinicians have also faced challenges in diagnosing and treating dengue fever in view of the wide range of presentations and complications.

Dengue fever is an acute febrile illness defined by the presence of fever and two or more of the following features: rash, headache, myalgia, arthralgia, leucopaenia, retro-orbital pain, haemorrhagic manifestations, plus exposure to a dengue endemic or hot spot area.[3] It is a mosquito-borne tropical disease transmitted principally by *Aedes aegypti*. The dengue virus is a single stranded RNA virus and has four different serotypes.[4] A diagnosis of dengue fever can be confirmed by dengue PCR, non-structural protein-1 (NS1 antigen) and dengue IgM. Being a dynamic disease, dengue fever can present in three phases, namely the febrile, critical and recovery phases.

Compartment syndrome is defined as elevated pressure within one of the body's compartments containing muscles and nerves, commonly in the leg and arm. Common causes include tibial or forearm fractures, haemorrhage, crush injuries, or prolonged limb compression, for example from plaster casts. In one case report, the compartment syndrome in dengue fever was caused by capillary leak syndrome.[1] This occurs as a result of an increase in vascular permeability leading to fluid leakage from the intravascular to the interstitial compartment. This further leads to haemoconcentration and hypovolemic shock. The systemic capillary hyperpermeability is caused by the release of a range of cytokines in dengue fever.

Our patient developed compartment syndrome of the right arm due to a haematoma (as evidenced by ultrasound) at the site of a previous arterial line insertion. The haematoma was severe as a result of thrombocytopenia (7 x 10^9/L) from dengue fever. This haematoma increased the intra-compartmental pressure, which compromised the capillary blood flow causing oedema of the surrounding tissue. Oedema raised the intra-compartmental pressure, which further compromised the venous blood flow and lymphatic drainage of the pathological area causing tissue ischaemia. Emergency fasciotomy was effective in treating compartment syndrome in dengue fever despite thrombocytopenia, both in our case and in one previous case. Table 1 illustrates the differences in compartment

FIGURE 1 Day 6 post emergency fasciotomy of the right arm

syndrome in dengue fever between the case described by Bandyopadhyay et al. and ours.

CONCLUSION

Patients, for whom arterial lines are inserted during the critical phase of illness, need to be closely monitored during the recovery phase for haematoma at the site of arterial puncture. A high index of suspicion is needed when assessing a haematoma of the limb in dengue fever to prevent complications of compartment syndrome. Emergency fasciotomy is the treatment of choice for dengue fever complicated by compartment syndrome.

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