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# The first patient with locally acquired dengue fever in Hong Kong

# 本港發現的首宗登革熱病例

**This report is of the first locally acquired case of dengue fever. The diagnosis was made even in the absence of a history of travel outside Hong Kong. The patient was a 21-year-old man, who presented with high fever, leukopenia, thrombocytopenia, and elevated liver enzymes. His haematocrit revealed mild haemoconcentration but the albumin was normal throughout the course of the illness. His blood pressure remained low with no tachycardia or overt shock syndrome. The pyrexia subsided 4 days after admission to hospital and all haematological and biochemical abnormalities eventually normalised. The pathogenesis, diagnostic criteria of dengue haemorrhagic fever and dengue shock syndrome, and control of dengue infection are discussed.**

本文報導本港發現的首宗登革熱病例。此病例的診斷是在患者沒有外遊病史的情況下作出的。患者為一名21歲男性，他出現高熱、白血球及血小板減少、以及高肝腖的病徵。紅細胞壓積顯示患者有輕微的血濃縮，而白蛋白在整個發病過程中一直維持正常。患者的血壓一直偏低，卻沒有心動過速或明顯的休克症狀。患者在住院四天後發熱減退，而血液學和生化學化驗亦回復正常。本文最後討論登革出血熱和登革休克綜合症的發病機理和診斷標準，並提出預防感染登革熱的方法。

## Case report

The patient was a 21-year-old man, whose illness started on 12 September 2002 with pyrexia, headache, chills, sore throat, anorexia, myalgia, and retro-orbital pain. He consulted a private practitioner but the fever persisted, so he consulted a government out-patient clinic 2 days later. He remained unwell and went to the Accident and Emergency Department at the Tuen Mun Hospital where he was admitted for persistent pyrexia. After admission, the patient revealed a history of travelling to mainland China, but that was 1 month previous to this episode. He stated that there were many mosquitoes at his place of work, but he could not recall whether he had recently been bitten either by mosquitoes or by any other insects.

At physical examination, his general condition was stable. His temperature was 38°C. His blood pressure was 115/50 mm Hg and there was no tachycardia. His face was flushed. His tonsils were enlarged and the pharynx was congested. A 1-cm diameter firm lymph node was present on the left side of the neck. Both conjunctivae were congested. A generalised confluent rash was present but there were no petechiae. The spleen was not palpable and examination showed that the other systems were normal.

His complete blood picture was as follows: white blood cell count, 3.9 $x10^9$/L (reference range, 4.5-11.0 $x10^9$/L); haemoglobin, 149 g/L (reference range, 140-175 g/L); and platelet count, 100 $x10^9$/L (reference range, 150-450 $x10^9$/L). Renal and liver function tests were normal. The clinical differential diagnosis included viral infection such as infectious mononucleosis, influenza, dengue fever, rickettial infection, malaria, and typhoid fever. Further investigations were instituted.

The fever was unremitting, reaching a peak of 40°C on day 4. The white blood cell count continued to fall to 1.9 $x10^9$/L 4 days after admission. The

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platelet count followed the same trend and was lowest on day 5, when it was only 49 x$10^9$/L. White cell differential count revealed neutropenia and lymphopenia with relative monocytosis. The haemoglobin level increased from 149 g/L to 168 g/L on day 5. The corresponding haematocrit was 43% and 49%, respectively, which were within the normal range, and did not rise more than 20% above the baseline value. The prothrombin time was normal but the activated partial thromboplastin time was prolonged to 42.1 seconds (reference range, 25-40 seconds). The D-Dimer was more than 1 μg/mL. The total protein and albumin level remained normal throughout the course of the illness. Alanine transferase started to increase on day 2 and peaked on day 4 at 305 U/L (reference range, 10-40 U/L), however. The clinical condition of the patient remained stable despite the persistent fever, neutropenia, and thrombocytopenia, but his blood pressure remained low, with some readings as low as 95/45 mm Hg. He received continuous fluid supplement and occasionally required a volume expander due to low blood pressure. He had no tachycardia throughout the course of the illness despite the low blood pressure and high fever.

At admission, the clinical diagnosis was viral infection, and dengue infection was high on the list of differential diagnoses. In view of the absence of any locally acquired dengue infection in the past and the incompatibility of this patient's travel history with the incubation period, other diagnoses were considered. Therefore doxycycline was commenced on day 4 on the presumptive diagnosis of rickettial infection. The pyrexia improved on the same day and he became afebrile on day 5. His appetite returned and his general well-being improved. On day 6, the Department of Health gave notice that the polymerase chain reaction (PCR) was positive for dengue fever serotype 1. The diagnosis was further confirmed by a four-fold rise in immunoglobulin M titre in the convalescent serum. Doxycycline was stopped. The patient remained afebrile. The white blood cells and platelets returned to normal. The alanine transferase began to decrease. The patient was discharged on day 11 after a good recovery. He defaulted follow-up at the out-patient clinic.

## Discussion

Dengue fever is a viral disease transmitted by the infected female *Aëdes* mosquito, mainly *Aëdes aegypti*. In Hong Kong, the most abundant mosquito species is *Aëdes albopictus*, which is less anthropophilic than *Aëdes aegypti*.

Four dengue virus serotypes have been identified.[1] The most common serotype in Hong Kong is type 1. The endemic regions of dengue fever include South-East Asia, China, and tropical and subtropical America.[1] During the past few decades, the distribution, severity, and incidence of the illness have been escalating.[2] This is likely to result from increased urbanisation causing inadequate management of water and waste,[2] which creates ideal breeding grounds for the larvae. Dengue fever has been included as a statutory notifiable disease in Hong Kong since 1994. Approximately three to 17 cases occur each year.

The incubation period of dengue infection is 4 to 7 days and the fever usually lasts for 5 to 7 days. Therefore, if the fever persists for more than 2 weeks, an alternative diagnosis should be considered. The clinical presentation ranges from a non-specific febrile illness, which could go unnoticed, to severe life-threatening conditions such as dengue haemorrhagic fever (DHF) and dengue shock syndrome (DSS). The clinical features of dengue fever are fever, headache, skin rash, myalgia, arthralgia, nausea, and vomiting. Laboratory findings include neutropenia, thrombocytopenia, and elevation of liver enzymes. The differential diagnoses include malaria, leptospirosis, typhoid fever, infectious mononucleosis, influenza, and rickettial infection, which share a similar clinical picture.

The more severe syndromes, DHF and DSS, are characterised by the presence of increased vascular permeability and consumptive coagulopathy. The vascular leakage of protein results in serous pleural effusion, ascites, and circulatory failure. The consumptive coagulopathy could manifest as clinical overt bleeding from various sites. The World Health Organization criteria for the diagnoses of DHF and DSS are shown in the Box.[1]

The present case is probably classic dengue fever, supported by the typical presentation and laboratory findings. This patient did demonstrate some low-grade consumptive coagulopathy, haemoconcentration, and low systemic blood pressure. However, there was no overt vascular leakage of protein, clinical bleeding, or circulatory failure. His liver enzymes were elevated to six times that of normal. Indeed, high-grade hepatic enzyme derangement has been reported in other studies.[3,4]

Dengue haemorrhagic fever and DSS rarely occur in primary infection. In primary infection, the host develops life-long immunity only against the specific serotype. At secondary infection with another serotype, the antibody

**World Health Organization criteria for the diagnosis of dengue haemorrhagic fever and dengue shock syndrome**

*Dengue haemorrhagic fever*
(1) Fever, or recent history of acute fever
(2) Haemorrhagic manifestations
(3) Low platelet count (≤100 000/mm$^3$)
(4) Objective evidence of plasma leakage due to increased vascular permeability
  a. Elevated haematocrit (≥20% above baseline)
  b. Hypoproteinaemia
  c. Pleural or other effusion

*Dengue shock syndrome*
Dengue haemorrhagic fever together with direct evidence of circulatory failure or indirect evidence manifested by all of the following:
(1) Rapid and weak pulse
(2) Narrow pulse pressure (20 mm Hg) or hypotension for age
(3) Cold, clammy skin and altered mental status

developed at primary infection cross-reacts and forms complexes with the viral antigen but, instead of inactivating the virus, the complex enhances the phagocytosis by mononuclear cells. The virus replicates inside the cells, which release the vasoactive immune mediators causing DHF and DSS.[5]

The definitive diagnosis of dengue infection depends on serological tests on paired acute and convalescence phase sera. Other methods include viral culture in a specific cell medium and PCR.

The treatment of dengue infection is mainly supportive. Steroid and antiviral agents are not effective. Paracetamol should be used as antipyretic agent instead of aspirin because of haemorrhagic tendency and possibility of Rye's syndrome. At present, there is no vaccine available against the virus. Community participation in vector control and environmental hygiene is the most effective measure to control the spread of this viral disease. An increase in public awareness of the disease by health promotion should help community participation and prevent delayed medical attendance. Travellers to endemic regions should be advised to wear long-sleeved clothes and trousers, use DEET-containing insect repellents, and use mosquito nets when the room is not air-conditioned.

## References


1. World Health Organization. Dengue haemorrhagic fever: diagnosis, treatment, prevention, and control, 2nd ed. Geneva: WHO; 1997.
2. Gibbons RV, Vaughn DW. Dengue: an escalating problem. BMJ 2002; 324:1563-6.
3. Kuo CH, Tai DI, Chang-Chien CS, Lan CK, Chiou SS, Liaw YF. Liver biochemical tests and dengue fever. Am J Trop Med Hyg 1992;47: 265-70.
4. Pancharoen C, Rungsarannont A, Thisyakorn U. Hepatic dysfunction in dengue patients with various severity. J Med Assoc Thai 2002;85 (Suppl 1):298S-301S.
5. Kurane I, Rothman AL, Livingston PG, et al. Immunopathologic mechanisms of dengue hemorrhagic fever and dengue shock syndrome. Arch Virol Suppl 1994;9:59S-64S.