# A CASE OF CHIKUNGUNYA MASQUERADING AS DENGUE

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## ABSTRACT

**A 22-year-old university undergraduate presented with persistent fever and appearance of rash on the 4th day of illness. On the 3rd day, he consulted his general practitioner (GP) who detected thrombocytopenia. The dengue duo test (dengue NS1 antigen, IgM and IgG) was negative. Concerned after the rash appeared, the patient sought consultation at the Emergency Department (ED) in a local hospital and was admitted. Investigations in hospital confirmed chikungunya infection. This case report highlights two key messages in the American Centers for Disease Control and Prevention (CDC) advisory: (1) it is difficult to distinguish chikungunya and dengue based on clinical findings alone; (2) the patient should be managed as having dengue until dengue has been excluded.**



**Keywords: Chikungunya, Dengue, Fever, Rash, Arthralgia, Myalgia, Thrombocytopenia**

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## INTRODUCTION

Chikungunya fever has been confused with dengue in the past, particularly in regions where dengue is endemic.[1,2,3] This article aims to (1) illustrate how chikungunya can masquerade as dengue, thereby contributing to diagnostic difficulty faced by primary care physicians; (2) discuss the evidence supporting how these two conditions can be differentiated;[3] and (3) illustrate some learning points from the case.

## CASE VIGNETTE

The patient is a 22-year-old Norwegian male, university undergraduate, who presented to the Emergency Department (ED) at a tertiary hospital in Singapore. He did not have any past medical history.

### Chief complaints

He had seen a general practitioner (GP) the day before for 3 days of intermittent fever, myalgia and 2 days of retro-orbital pain. The GP performed a full blood count and dengue duo test which revealed a platelet count of $103x10^9$/L and negative results for dengue NS1 antigen, IgM and IgG. He was treated symptomatically with antipyretics for presumed viral fever and given a follow-up appointment in 2 days to monitor his platelet counts.


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He presented to the ED due to persistence of the fever (4th day) and a sudden onset of a non-pruritic rash distributed over his chest and back. He was concerned about whether the GP had made a misdiagnosis and if he required antibiotics.

He described his fever as having intermittent spikes with a maximum temperature of 38.9°C that was associated with myalgia and generalised lethargy. His retro-orbital pain had resolved and there were no visual disturbances. He did not have any chills, rigors, arthralgia, bleeding tendencies nor abdominal pain, and there was no change in urinary or bowel habits. There was no cough, rhinorrhoea or breathing difficulty.

### Travel and social history

Three days prior to the start of his fever, he had visited a forested area at the southern ridges in Singapore with his friends. He had also travelled to Thailand, Laos and Vietnam for jungle trekking two months earlier and visited the Philippines one month earlier and Malaysia three weeks earlier for a holiday. He remained asymptomatic then and did not remember being bitten by any insect or animal. He had no significant contact history. He was sexually active but denied unprotected sex. He did not consume any illicit drugs or participate in intravenous drug abuse.

### Physical findings at presentation to the ED

His temperature was 38.1°C, blood pressure was 120/81mmHg and heart rate was 88 beats per minute. He was alert with no pallor or jaundice. He did not have any epistaxis, gum bleeding or bruising. A blanchable maculopapular rash was noted over his chest and back with islands of sparing. There were no lesions on his palms and soles. Examination of the oropharynx was normal. Heart sounds were dual and he had vesicular breath sounds. His abdomen was soft, non-tender and there was no hepatosplenomegaly. No lymph nodes were palpable.

### Progress

The progress of illness is shown in Figure 1 on the timeline of events. The patient was subsequently admitted to the general ward with the provisional diagnosis of viral fever with thrombocytopenia for investigation.

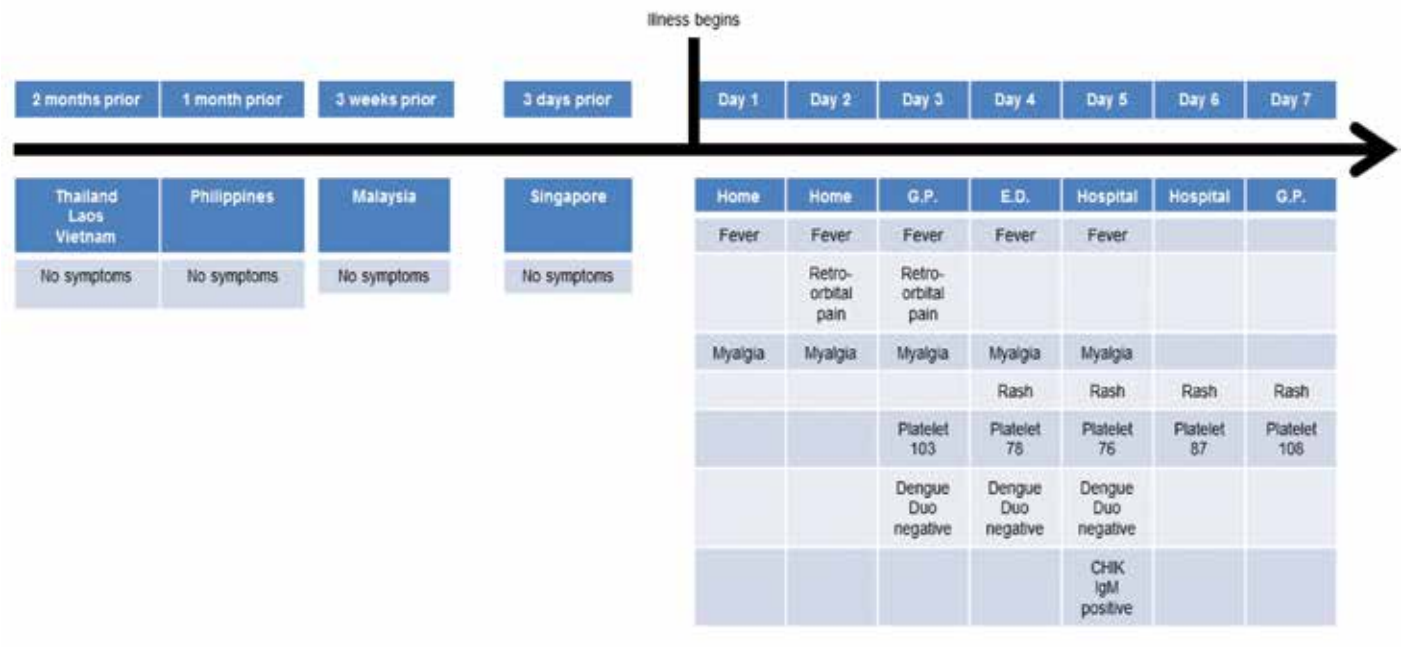
### Investigations

The following investigations were done in the hospital on admission:

Dengue duo test:
- Dengue NS1: Negative.
- Dengue IgM: Negative.
- Dengue IgG: Negative.

Malaria microscopy: No malaria parasite seen.

**Figure 1. Timeline of events in the patient's illness.**




Chikungunya IgM: Ordered on admission, results available the next day showed IgM positive.

Full blood count:
- Haemoglobin: 15.0g/dL (12.9 - 17.0).
- White Blood Cell: 3.77x$10^9$/L (3.40 - 9.60).
- Platelets: 78x$10^9$/L (132 - 372).
- Haematocrit: 42.5% (37.5 - 49.3).
- Lymphocytes: 1.71x$10^9$/L (0.94 - 3.08).

Liver function test: Normal.

Tests for differential diagnoses of leptospirosis, hepatitis viruses (A, B, C), cytomegalovirus, Epstein Barr virus and human immunodeficiency virus infections done later in the general ward were also negative. Blood and urine cultures did not show any growth of organisms and his chest X-ray was normal.

With the positive results of chikungunya infection, the patient was informed that he did not have a dengue infection. He was later discharged with antipyretics and given a follow-up appointment with his GP to monitor his platelet counts.

## GAINING INSIGHT

This patient presented with fever for 4 days. He asked, "Why is the fever lasting this length of time? Are the blood tests accurate? Is my condition serious and do I need to be admitted to the hospital?"

## MANAGEMENT

The management of this case can be discussed as phases:

**(1) Before the diagnosis of the chikungunya infection**

The GP who had initially seen the patient had given him instructions to return for a review and to watch out for warning signs such as bleeding and abdominal pain. Furthermore, even though the dengue duo test performed was sensitive and specific, positive detection rate is not 100 percent in cases of secondary dengue (defined as dengue infection in a host that has previously been infected by a dengue virus, or after non-dengue flavivirus vaccination or infection). This was shown in the paper by Wang et al,[4] where the positive detection rate by dengue duo assay for secondary dengue was only 90 percent.

In the hospital, the patient was informed that although the initial dengue test was negative, there was still a possibility of false-negative results. Moreover, as he had fever, myalgia, rash, lethargy and thrombocytopenia, he had fulfilled the 2009 WHO criteria for probable dengue with warning signs (see Table 1). Furthermore, due to his significant travel history to multiple countries, additional tests for other offending organisms would also be performed together with the repeat dengue test.

Although he did not have leukopenia or a raised haematocrit, he was admitted to the hospital to monitor for signs of shock and haemorrhage. This was in view of his lethargy and falling platelet level, which are warning signs that predict a higher risk of progression to severe dengue. He was also monitored for a drop in postural blood pressure which he did not have. The patient was treated symptomatically with paracetamol and the administration of intravenous fluids (2.5 litres was given over 24 hours).

The repeat dengue duo test (utilising the SD BIOLINE Dengue Duo kit) was negative. Thus, the diagnosis of dengue fever was very unlikely, given the high sensitivity and specificity of the test as seen in Table 2.

**Table 1: 2009 WHO classification for diagnosing dengue**

| **Dengue without warning signs** |
|---|
| Fever and two of the following:<br>1. Nausea, vomiting<br>2. Rash<br>3. Aches and pains<br>4. Leukopenia<br>5. Positive tourniquet test |
| **Dengue with warning signs (requires strict observation and medical intervention)** |
| Dengue (as defined above) with any of the following:<br>1. Abdominal pain or tenderness<br>2. Persistent vomiting<br>3. Clinical fluid accumulation (ascites, pleural effusion)<br>4. Mucosal bleeding<br>5. Lethargy, restlessness<br>6. Liver enlargement >2 cm<br>7. Laboratory: increase in haematocrit concurrent with rapid decrease in platelet count |
| **Severe Dengue** |
| Dengue with at least one of the following criteria:<br>1. Severe plasma leakage leading to:<br>– Shock (Dengue Shock Syndrome)<br>– Fluid accumulation with respiratory distress<br>2. Severe bleeding as evaluated by clinician<br>3. Severe organ involvement<br>– Liver: AST or ALT ≥ 1000<br>– Central nervous system: impaired consciousness<br>– Failure of heart and other organs |

**Table 2. Sensitivity and specificity of dengue duo test**[5]

| | Dengue NS1 Ag | Dengue IgG/IgM |
|---|---|---|
| Sensitivity | 92.4% | 94.2% |
| Specificity | 98.4% | 96.4% |

**Table 3. A comparison of typical chikungunya and dengue features with this case**

| Feature | Chikungunya | Dengue | This Case |
|---|---|---|---|
| Fever (>39°C) | +++ | ++ | - |
| Arthralgia | +++ | +/- | - |
| Arthritis | + | - | - |
| Headache | ++ | ++ | + |
| Rash | ++ | + | ++ |
| Myalgia | + | ++ | ++ |
| Haemorrhage | +/- | ++ | - |
| Shock | - | + | - |
| Lymphopenia | +++ | ++ | - |
| Neutropenia | + | +++ | - |
| Thrombocytopenia | + | +++ | ++ |
| Haemoconcentration | - | ++ | - |

**Source: CDC factsheet 2014. Chikungunya: Clinical management in dengue-endemic areas.**

**(2) After the diagnosis of chikungunya infection**
The patient was informed that he had chikungunya fever diagnosed by a blood test and that he did not have dengue fever. It was evident that he had been infected in Singapore given his travel history and the incubation period of the chikungunya virus (2 to 4 days). Moreover, chikungunya infection is endemic in Singapore. His concerns and anxieties were also allayed by explaining that no antibiotic was required and that the fever would eventually resolve.

**(3) Closure**
As he remained haemodynamically stable throughout his hospital stay and showed clinical improvement with a rising platelet trend, he was discharged on day 6 of his illness. He was arranged to follow up with his GP and told that he could return to school but to watch out for red flags such as bruising, gum bleeding, giddiness, severe vomiting, diarrhoea and abdominal pain. Additionally, he should avoid sports and strenuous physical activity until his platelet levels normalized. To prevent further transmission of the disease, he was advised to protect himself and household members from mosquito bites during this period.

On day 7 of his illness, he was reviewed by the GP and his platelet count had increased to $108x10^9$/L. He had full resolution of his symptoms and has been well since.

## DISCUSSION

**(1) Atypical features in this case**
This case highlights the patient's journey in a chikungunya infection presenting atypically. For a while the quandary was: Is this dengue?

The features in this case were different from typical cases in the following ways — the onset of fever was more gradual than acute, the duration of fever was longer than expected, there was no arthralgia and thrombocytopenia was noted to be below $100x10^9$/L.

In Table 3, this case is compared with the typical clinical and laboratory features of chikungunya and dengue infections based on the American Centers for Disease Control and Prevention (CDC) factsheet.[6] Although Table 3 seems to suggest that haemoconcentration and shock are distinguishing features between chikungunya and dengue, one should bear in mind that they both occur in severe dengue. Since most cases of dengue fever in Singapore are not severe,[7] haemoconcentration and shock may not be useful distinguishing features in this patient.

It is also important to note that there are other atypical or severe disease presentations of chikungunya fever that have been reported involving various systems[8] — neurological (meningoencephalitis), ocular (retinitis), cardiovascular (myocarditis), dermatological (vesiculobullous dermatosis), hepatic (acute hepatitis), and renal (nephritis). These are more common in children and the elderly.

**(2) Known typical clinical features of chikungunya infection**
The typical features of both chikungunya fever and dengue

**Table 4. A comparison of the typical features of chikungunya infection internationally**

| Typical features | Lee et al. 2012, Singapore[3] | Win et al. 2010, Singapore[9] | Mohd et al. 2013, Malaysia[10] | Laoprasopwattana et al. 2012, Thailand[11] | Kularatne et al. 2007, Sri Lanka[12] | Reller et al. 2013, Sri Lanka[13] | Tarap hdar et al. 2012, India[14] | Rezza et al. 2014, Yemen[15] | Nkoghe et al. 2010, Gabon[16] | Hochedez et al. 2008, France[17] | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Number of patients | 117 | 97 | 53 | 32 | 23 | 28 | 131 | 49 | 270 | 22 | 822 |
| Fever at presentation | 105 (90%) | 87 (90%) | 51 (96%) | 32 (100%) | 23 (100%) | 28 (100%) | 131 (100%) | 49 (100%) | 232 (86%) | 22 (100%) | 760 (92%) |
| Arthralgia at presentation | 111 (95%) | 85 (88%) | 51 (96%) | 31 (96%) | 20 (87%) | 20 (71%) | 92 (70%) | 48 (98%) | 227 (84%) | 22 (100%) | 707 (86%) |
| Rash at presentation | 47 (40%) | 35 (36%) | 31 (59%) | 28 (88%) | 7 (30%) | 3 (11%) | 52 (40%) | 13 (27%) | 111 (41%) | 16 (73%) | 343 (42%) |
| Footnote: *Calculated percentages in brackets for individual studies.* | | | | | | | | | | | |

fever have been described in the CDC factsheet 2014 (see Table 3).

Table 4 shows a comparison of these features from different studies conducted locally and overseas. It can be seen that almost all patients had fever and arthralgia. In a prospective cohort study in Singapore,[9] patients with chikungunya fever with persistent arthralgia tended to be females. The calculated percentages for the whole series are shown in the last column.

**(3) Reports of similar cases in the literature**

A local study [3] found that although key significant differences existed between dengue and chikungunya infection, there were substantial overlaps in the symptoms and signs. The key differences that were most apparent at presentation were leucocytosis, myalgia and arthralgia in chikungunya cases, compared to thrombocytopenia in dengue cases.

**(4) Dual infection**

Moreover, one must also be aware that the two diseases can also be seen simultaneously in the same patient.[18]

**(5) Manage as dengue until chikungunya infection is confirmed**

It is important to distinguish chikungunya fever from dengue fever as the latter has the potential for considerably worse outcomes, including death. Where the illness is prolonged, sustaining the patient's confidence is important. Although differentiation of chikungunya from dengue may not alter supportive management, it would be useful in the diagnosis and advice to patients of the expected clinical course. This patient had initially seen a GP but later ended up in the tertiary hospital on his own accord due to his concern over his fever and sudden appearance of his rash. Informing the patient of the likely disease progression and on the red flags to seek medical attention will empower the patient and allay concerns. When faced with a diagnostic dilemma, close follow up and vigilance to pick up new signs and symptoms on the physician's part is also required.

Finally, since January 2008, Singapore has experienced autochthonous transmissions of chikungunya virus in areas where *Aedes albopictus* and *Aedes aegypti* mosquitoes were present and has suffered 2 major outbreaks in 2008 and 2013. As such, vector control is extremely important and remains the sole method for reducing transmission of chikungunya as no vaccine is currently available. Physicians must do their role in educating patients about safeguard measures and source reduction methods to control the spread of mosquito-borne diseases.

## CONCLUSION

(1) This case highlights similarities between chikungunya and dengue infections, and the difficulty in distinguishing the two by symptoms and signs alone.

(2) This case also highlights the importance of managing the patient as having dengue until dengue has been excluded.

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