



## Case Report

### Double trouble: A case report of concurrent dengue fever in acute perforated appendicitis

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#### ABSTRACT

**Introduction:** Dengue fever (DF) is a commonly encountered infectious disease in tropical countries. It can sometimes be complicated by other pathologies, making it challenging to arrive at a diagnosis. In Malaysia, DF has the highest incidence of all infectious diseases. It occurs year-round, and the number of cases reported is currently at an all-time high.

**Aim:** This paper aims to highlight our diagnostic dilemma in managing DF with acute perforated appendicitis.

**Case study:** A 15-year-old female presented to the Emergency Department after testing serologically positive for DF at a primary care centre. She was discharged home for self-monitoring and recovery. Unfortunately, on the 7th day of illness, she returned with a severe right lower abdominal pain and vomiting. Her blood count showed platelet count of  $58 \times 10^3/\mu\text{L}$  and a haematocrit level of 32.9%. A subsequent contrast-enhanced computed tomography of the abdomen revealed an inflamed appendix with the presence of a faecolith. An emergent diagnostic laparoscopy confirmed a perforated appendix with faecolith. As the line between the symptoms of DF and acute abdomen blurred, we encountered a diagnostic dilemma that caused a delay in management, resulting in perforated appendicitis.

**Results and discussion:** We studied similar incidences in other case reports worldwide. We identified that the most suitable method of differentiating an acute abdomen from other pathologies is by imaging, either via ultrasound or computed tomography studies.

**Conclusions:** We established that early clinical suspicion and prompt action are key to recognising an acute abdomen and preventing further complications due to delayed diagnosis.

## 1. INTRODUCTION

Dengue fever (DF) typically progresses through three distinct phases: febrile, critical, and recovery.<sup>1</sup> Pyrexia and general debility characterise the febrile phase. Symptoms may range from mild to severe, depending on the presence of warning signs and patient comorbidities. The resolution of the initial fever and an apparent improvement marks the critical phase. However, it also involves an increase in capillary leakage and can lead to shock, bleeding, and organ dysfunction.<sup>2</sup> Finally, the patient enters a recovery phase, with fluid reabsorption and the resolution of thrombocytopenia and leukopenia. A significant proportion of individuals confirmed through serological tests as having dengue frequently report abdominal pain.<sup>3</sup> It is noteworthy that this symptom occasionally presents diagnostic challenges. While it is typically attributed to hepatomegaly, a characteristic feature of DF, it may also arise from other acute abdominal pathologies such as perforated viscera, acute appendicitis, acute pancreatitis, acute cholecystitis, intestinal obstruction, or even idiopathic peritonitis.<sup>4</sup>

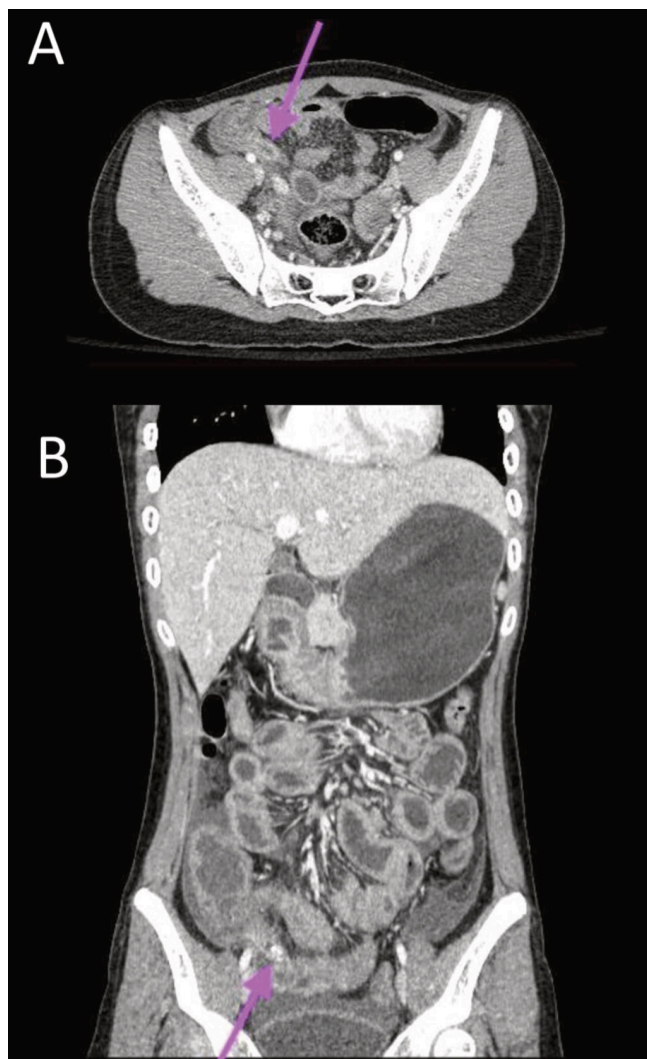
The challenges in this context pertain to determining the cause of abdominal pain and the appropriate timing to commence diagnostic procedures in order to establish the presence or absence of a concurrent surgical pathology. It is imperative to emphasise the need for a swift decision once clinical suspicion arises following a comprehensive patient history and focused physical examination. Herein, we discuss a young female who was seropositive for DF and developed right lower quadrant abdominal pain as her illness progressed. However, due to the overlap of symptoms between DF and acute abdomen, we encountered a diagnostic dilemma that caused a delay, resulting in her condition worsening.

## 2. AIM

This paper aims to highlight our diagnostic dilemma in managing DF with acute perforated appendicitis.

## 3. CASE STUDY

A 15-year-old Indigenous girl with no known medical illnesses first presented to a district hospital with a fever on day 1 of the disease. She was serologically diagnosed with DF by a positive non-structural protein 1 antigen test. The patient was discharged for home recovery, given that no other alarming symptoms were observed. On the morning of day 7 of the illness, which was still within the critical phase of dengue infection, the patient developed severe abdominal pain and vomiting. She sought medical attention at a primary care facility and was referred to a tertiary hospital. Her pain was localised to the right lower abdomen, and further questioning revealed no symptoms of haematuria or radiation to the loin area. The patient reported opening bowels once daily and no changes in her bowel habits. Additionally, she was on the seventh day of her menstrual cycle, and a systemic review was unremarkable.



**Figure 1.** Axial (A) and coronal (B) contrast-enhanced CT images of the abdomen and pelvis showing the vermiform appendix (arrow) to be dilated, filled with appendicolith, and surrounded by fluid, suggestive of acute appendicitis.

Physical examination showed that she had good perfusion and fair hydration status. Her blood pressure was borderline at 90/50 mm Hg, and she was tachycardic at 110 bpm. The patient was afebrile and spoke in full sentences, with tenderness and guarding of the right iliac fossa and suprapubic areas observed. Examination of the hernial orifices, genitalia, and digital rectal examination were normal. The patient's full blood count showed a haemoglobin level of 13.4 g/dL, a white cell count of  $4.1 \times 10^9/L$  (predominant neutrophilia of 86.6%), a platelet count of  $58 \times 10^3/\mu L$ , and a haematocrit level of 32.9%. The liver and renal function tests as well as C-reactive protein were unremarkable.

Urgent contrast-enhanced computed tomography (CT) of the abdomen was performed after her haemodynamic status improved with hydration. This empirically revealed an inflamed appendix with the presence of a faecolith (Figure 1). Emergent diagnostic laparoscopy confirmed a perforated

appendix with faecolith. The caecum and small bowel were healthy with generalised purulent contamination. A laparoscopic appendectomy was performed and the patient recovered well after the surgery. She was discharged following the completion of DF management.

#### 4. RESULTS AND DISCUSSION

DF is a vector-borne viral illness and a public health problem of increasing magnitude in tropical countries.<sup>5</sup> The dengue virus, the cause of DF, is a mosquito-borne singlestranded RNA virus belonging to the family Flaviviridae. There are four serotypes of the dengue virus (DEN1, DEN2, DEN3, and DEN4), all of which can result in the full spectrum of the disease.<sup>6</sup> Apart from fever, the leading presentations among patients infected with the dengue virus are arthralgia, myalgia, vomiting, diarrhoea, petechial rash, and abdominal pain.<sup>7</sup> Abdominal pain is a warning sign strongly associated with severe dengue.<sup>8</sup> Close attention to hydration status and laboratory parameters is essential to determine if a patient is suffering from severe dengue. Overall, there is a male preponderance in the context of dengue infection. However, in terms of the occurrence of acute abdomen in dengue, the gender distribution shifted, with females being more affected than males by a ratio of 1 : 2. This trend is consistent with the findings reported by Khor et al., suggesting that acute abdomen in dengue patients is more prevalent among females than males.<sup>9</sup> It is important to also consider concurrent diagnoses of an acute abdomen, especially if the symptoms persist beyond the usual expected timeline of the illness. Close attention needs to be given to patient complaints and examination findings, such as rebound tenderness and abdominal rigidity and guarding. In addition, blood tests especially inflammatory markers must be scrutinized to catch any abnormalities that could indicate another pathology entirely.

Leucocytosis and elevated C-reactive protein are common. Various scoring systems have been developed to assist clinicians in diagnosing appendicitis, using parameters from clinical history, physical examination, and laboratory tests. The most widely used scoring tools are the Alvarado score, modified Alvarado score, Raja Isteri Pengiran Anak Saleha Appendicitis (RIPASA) score, and Appendicitis Inflammatory Response score.<sup>10–12</sup> These have been used for diagnostic and risk stratification, separating those requiring only observation from those requiring intervention. However, it is noteworthy that the majority of the scoring systems incorporate leucocytosis as a laboratory parameter. Their use is limited in the risk stratification of dengue patients with abdominal pain, of which leucopenia is the hallmark. In this case specifically, none of the scoring systems were used as the suspicion of an acute/perforated appendicitis did not arise during clinical evaluation until quite late into the patient's presentation. At that point, an urgent CT of the abdomen had already been performed. In retrospect, we would like to comment that an earlier suspicion of an acute/perforated appendicitis will have led us to using one of the scoring systems above to stratify the patient's risk.

The specificity and sensitivity of transabdominal ultrasound for diagnosing acute appendicitis are limited, however, the use of ultrasonography can supplement the clinical examination performed by each physician.<sup>13</sup> CT of the abdomen is the standard imaging modality for diagnosing acute appendicitis, and it is widely accepted as the gold standard.<sup>14,15</sup> Specific and sensitive findings observed in appendicitis include dilatation, wall thickening, peri-appendiceal inflammation, and necrotic changes. A contrast-enhanced CT is immensely useful to make the diagnosis of dengue hemorrhagic fever based on its findings, such as a pleural effusion, patchy exudation, multiple abdominal lesions, ground-glass opacification, ascites, pericholecystic oedema, pancreatitis, and perinephric hematoma. Both a chest and abdomen contrast-enhanced CT may be performed in one sitting to maximise the discovery of significant findings that can lead the clinician to make the diagnosis earlier. Patients that are a good candidate are those who are those with normal renal profiles, are hemodynamically stable and have no contrast allergies, although the latter is not an absolute contraindication.

A systematic review by Soltani et al in their systematic review of viruses in acute appendicitis has found that DF virus may have an association with acute appendicitis, however the exact mechanism and relationship is yet to be understood.<sup>16</sup> If a diagnosis is made, it is necessary to decide whether the patient can undergo surgery to remove the pathological appendix or whether to proceed with conservative management if the patient is not fit for surgery.<sup>17</sup> The latter may occur in patients with perforated or necrotic appendices, who may benefit from non-surgical resuscitation in the first few days, provided they are haemodynamically stable.<sup>18</sup> In such cases, the patient may benefit from image-guided percutaneous drainage of intraabdominal collection to achieve source control. Drawing attention to our case, we would like to stress that the challenges lie in diagnosing an acute appendix and the diagnosis timing. Ideally, the diagnosis should be made immediately after clinical suspicion arises. If there is any doubt in the patient's progress – for instance, rapid clinical deterioration – emergent imaging should be performed to rule out an intraabdominal surgical pathology. This combination of diseases entails timecritical management to prevent complications such as perforation, necrosis, bowel ischaemia, toxic shock syndrome, severe sepsis, and death.<sup>19</sup>

This case underscores the urgent need for improved diagnostic tools and protocols tailored to patients with dengue and abdominal symptoms. Implementing rigorous clinical assessments, considering complementary diagnostic imaging, and involving multidisciplinary teams can collectively aid in prompt diagnosis and management while reducing the likelihood of misdiagnosis and unnecessary intervention. Additionally, raising awareness among healthcare professionals about the complexities of diagnosing appendicitis in the presence of severe dengue can contribute to better-informed decision-making and, ultimately, more favourable patient outcomes.

## 5. CONCLUSIONS

- (1) When treating patients with DF, early clinical suspicion and prompt action are of the utmost importance in identifying and treating acute abdominal pathologies such as appendicitis.
- (2) Caution should be exercised, particularly in cases of worsening abdominal symptoms or sudden deterioration.
- (3) Overlapping symptoms of DF and appendicitis can pose a diagnostic dilemma that may result in delayed treatment.

### Conflict of interest

Authors declare that there is no conflict of interest.

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