

## Acute Kidney Injury in Patients with Dengue Shock Syndrome

### Dang Şok Sendromlu Hastalarda Akut Böbrek Hasarı

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#### ABSTRACT

High mortality rates occur annually in people infected with dengue virus because it is accompanied by shock or dengue shock syndrome (DSS). Often the occurrence of DSS is followed by the condition of acute kidney injury (AKI). Rapid and appropriate management will bring a good prognosis for patients. We report a 39-year-old female patient who experienced DSS, after getting prompt and appropriate therapy the patient survived.

**Keywords:** Acute kidney injury, Dengue shock syndrome, Management

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#### ÖZET

Dang virüsü ile enfekte olan kişilerde her yıl yüksek ölüm oranları meydana gelir çünkü buna şok veya dang şok sendromu (DSS) eşlik eder. Genellikle DSS oluşumunu akut böbrek hasarı (AKI) durumu takip eder. Hızlı ve uygun yönetim, hastalar için iyi bir prognoz getirecektir. DSS yaşayan 39 yaşında bir kadın hastayı, hızlı ve uygun tedaviyi aldıktan sonra hastanın hayatta kaldığını bildirdik.

**Anahtar Sözcükler:** Akut böbrek hasarı, Dang şok sendromu, Yaklaşım

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## INTRODUCTION

Around 50 million people are infected with dengue virus every year, 500,000 are accompanied by shock (dengue shock syndrome) with a mortality rate of 2.5% (1). Around 11 thousand DHF patients were reported in Indonesia in 2006 with 1,152 cases of death (case fatality rate/CFR 1.03%) (1). Acute kidney injury (AKI) is one of the complications of dengue and is associated with poor prognosis. From this background, it is felt necessary to learn about the incidence of AKI in DSS patients so that prompt management can be known in the handling of this case.

## CASE REPORT

A female patient, 39 years old, are admitted to the hospital with complaints of fever since 5 days before. Fever occurs suddenly and continuously. The patient also felt pain in the right upper quadrant, heartburn, and minimal urine production and reddish color of urine.

On physical examination found the patient is fully alert, blood pressure 80/palpation mmHg, pulse rate 112 times/minute, respiratory rate 24 times/min, axial temperature 39°C. No eyelid edema, no signs of anemia or jaundice. On-ear nose and throat examination there were no tonsils enlarged, no hyperemia on the pharynx. Jugular venous pressure PR + 0 cmH<sub>2</sub>O. Normal heart sounds without murmurs, ronchi and minimal wheezing in the basal of both lungs. In the abdomen found shifting dullness, liver palpable 5 cm below the rib cage, spleen not palpable, tenderness in the right upper quadrant and epigastrium, edema extremities and acral warm palpable. Urine production of 200 ml in 24 hours (0.15 cc/kgBW/hour).

Laboratory tests showed Hemoglobin (Hb) 13.7 g/dl, Hematocrit (Hct) 41.17%, white blood cell (WBC)  $4.16 \times 10^3$  /uL, platelet (PLT)  $8.43 \times 10^3$  /uL, serum creatinine (SC) 2.63 mg/dl, blood ureum nitrogen (BUN) 28 mg/dL, serum potassium 3.7 mEq/l, arteries blood pH; 7.38 and bicarbonate; 16.7 mEq/L, aspartate aminotransferase (AST) 6.3 U/L, alanine aminotransferase (ALT) 2124.6 U/L, total bilirubin 1.73 mg/dl, albumin; 3.3 g/dl, partial thromboplastin time (PTT) 17.6 seconds, international normalize ratio (INR) 1.53 and activated partial thromboplastin time (aPTT) of 48 seconds. Urinalysis shows a dark yellow color, urine pH 6, leukocytes (-) leukocyte/uL, red blood (+3) and protein (+4), leukocyte sediment 46.3/HPF and sediment erythrocyte of 2.6/HPF. The test results of seromarkers of HBsAg and anti-HCV were non-reactive. Immunoglobulin-M anti-DHF negative, but Ig-G anti-DHF was positive. Ultrasonography shows a sign of ascites, and there is no picture of ileus. Chest X-ray shows cardiomegaly with pulmonary edema.

Based on the examination that has been done, the patient's diagnosis is dengue shock syndrome with pleural effusion, ascites, cholecystitis, and AKI stage III et prerenal + renal ether accompanied by anuria and metabolic acidosis. Patients receive fluid therapy, drip norepinephrine, intravenous antibiotics, and symptomatic treatment. The patient underwent hemodialysis (total of 6 sessions), there was improvement in urine production and GFR. Her clinical status improved gradually and returned after 15 days of treatment.

## DISCUSSION

The incidence of AKI in DHF patients is associated with renal hypoperfusion due to hypovolemia due to shock, hemolysis, or rhabdomyolysis. Kidney disorders that often occurs in DHF Patients are prerenal AKI arising from renal hypoperfusion as manifestations are increased oliguria and creatinin serum, resulting in decreased glomerular filtration rate (GFR). Manifestations of dengue fever have clinical variation, ranging from those that are invisible to bleeding and shock (2). If the treatment done is apparently inadequate, it will cause hemodynamically unstable then hypovolumic shock (2). Patients have signs of plasma extravasation ascites and edema of lower extremities and symptoms of renal hypoperfusion indicated by decreased GFR marked by oliguria and an increase in serum creatinine.

Laboratory abnormalities found in patients with dengue include leukopenia, significant thrombocytopenia and increased hematocrit. Also, patients may show abnormal results on coagulation tests, increased urea and creatinine, low levels of complement 3 (C3) components and changes in urinalysis results (proteinuria, hematuria and leukocyturia) (2).

In this case, it was found with laboratory results of severe thrombocytopenia, increased hematocrit (HCT), blood urea nitrogen (BUN), and serum creatinine (SC) values while proteinuria and hematuria were also found. The diagnosis of this patient's disease was upright after the serological examination of IgG anti-dengue in patients with positive results.

Adequate management of these patients depends on early identification of severe dengue warning signs, which are very important to reduce mortality, ongoing clinical and laboratory monitoring and immediate management to ensure hemodynamic stability and ventilation. The priority is to rebuild blood circulation volume quickly by administering crystalloid solutions (2). In this case, initial therapy was carried out with adequate fluid administration, antibiotics, supportive therapy, as well as close monitoring of vital signs and routine evaluation of laboratory parameters.

The research data showed that the mean serum creatinine level of DSS patients was higher compared to non-shock DHF patients. This means that impaired renal function in DSS patients is more common when compared to non-shock DHF patients because hypovolemic shock occurs in DSS or DHF grade III (initial hypovolemic shock) and IV (profound shock) (1). This means that in addition to kidney hypoperfusion caused by hypovolemia and shock in DHF triggering AKI. Other reports from India, found that the manifestations of AKI in DHF patients were not caused by shock, hemolysis, or rhabdomyolysis, or nephrotoxic drugs, but due to direct dengue virus injury mediated by an antigen-antibody reaction in the glomeruli. This is proven by the discovery of a decrease in complement C3 and C4 as a result of immune-mediated acute glomerular injury (3,4). The same thing was reported by Futrakul et al in Thailand who found an increase in serum creatinine in 43% and a decrease in C3 complement in 82% of DHF cases (5). In this case, the suspected cause of AKI is hypoperfusion, but other causes cannot be ruled out. Therefore, the biopsy is needed to know the cause of AKI in this patient.

A careful assessment of the warning signs of severe dengue and blood volume of the patient is very important for the prevention of AKI. Fluid replacement must be done carefully to avoid overload which results in worsening intravascular fluid extravasation, which may increase morbidity and mortality. Replacement of fluids must initially be carried out with a crystalloid solution, whereas the use of colloids must be limited to cases of responsive shock. The amount of fluid infusion must be the minimum needed to stably maintain hemodynamic conditions until an increase in vascular permeability is reversed use. After the diagnose of an AKI, treatment support must be timely and adequately carried out to prevent the worsening of the condition. Kidney replacement therapy is currently indicated as conventionally used, because there are no specific recommendations exactly what time to start treatment, dose or modality of dengue patients (2,4).

## CONCLUSION

In summary, there has been reported a case of 39 years old female patient with AKI related to DSS. Proper and prompt treatment in critical conditions is a necessity, besides that vital signs and laboratory monitoring is also more stringent is needed with the aim of reducing morbidity and mortality rates.

## Conflict of interest

No conflict of interest was declared by the authors.

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