CT Findings in Acute Renal Cortical Necrosis (ARCN): A Case Report

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A 67-year-old man suffered from retroperitoneal abscess and sepsis after left hemicolecction due to advanced colon carcinoma, resulting in disseminated intravascular coagulation (DIC). Enhanced computed tomography (CT) showed a lack of cortical enhancement in the arterial phase images despite normally enhanced renal arteries and branches, and well-enhanced renal medulla with a narrow subcapsular cortical enhancement on the parenchymal phase images. These CT findings were typical of acute renal cortical necrosis (ARCN) and obviate the need for renal biopsy, which has been considered to the gold standard for diagnosis. (Kitakanto Med J 2007; 57: 245~246)

Key Words: acute renal cortical necrosis, acute renal failure, computed tomography (CT), enhancement

Introduction

Acute renal cortical necrosis (ARCN) is an extremely rare cause of acute renal failure, and has been considered a severe condition with an almost invariably fatal outcome. It has been claimed that obstetric cases constituted the most frequent underlying case of ARCN, and abruption placentae was the single most underlying cause. Renal biopsy was considered the gold standard in diagnosing ARCN. Recently, however, striking changes have been noted in etiology, mortality, and diagnostic procedures, i.e., 1) an increased incidence of nonobstetric causes, 2) declining mortality, and 3) the use of noninvasive diagnostic procedures, such as computed tomography (CT).

In this report, we discuss typical CT findings in a nonobstetric case of ARCN.

Case

A 67-year-old man undergoing left hemicolecction due to advanced colon carcinoma developed anastomotic leakage resulting in left retroperitoneal abscess and sepsis. Despite conservative treatment with antibiotics, the patient remained febrile, and a diagnosis of disseminated intravascular coagulation (DIC) was made. The patient had an unstable clinical course. Enhanced computed tomography (CT) was conducted to evaluate the left retroperitoneal abscess. In the

Fig. 1a. Arterial phase CT: The bilateral renal cortex was not enhanced despite normally enhanced renal arterial branches.

Fig. 1b. Parenchymal phase CT: Renal medulla is well enhanced with narrow subcapsular cortical enhancement.
arterial phase CT (Fig. 1a), the bilateral renal cortex was not enhanced despite normally enhanced renal arterial branches. The parenchymal phase CT (Fig. 1b) showed a well-enhanced renal medulla with narrow subcapsular cortical enhancement. From these CT findings, we diagnosed ARCN. A retroperitoneal abscess was also seen, but otherwise no gross abnormality, including ischemic disease of the abdominal organs was observed. At enhanced CT, there was no evidence of renal function impairment (serum creatinine, 0.9 ml/dl), but serum creatinine was elevated to 3.2 ml/dl the next day. CT-guided drainage tube insertion was done for the retroperitoneal abscess, but the patient died.

**Discussion**

ARCN is an extremely rare cause of acute renal failure. Because of recent changes in etiology of ARCN, i.e., nonobstetric causes have become more frequent than obstetric causes, physicians must be aware of this rare condition. ARCN was considered a severe condition with an almost invariably fatal outcome,\(^1\) but recently, increased numbers of cases survive also longer due to improvements in treatment by dialysis.\(^1\)

In addition to obstetric causes, such as abruption placentae and abortion, nonobstetric clinical conditions, such as sepsis, hemolytic uremic syndrome (HUS), toxins, snake bite, drugs, trauma, and acute pancreatitis may trigger ARCN.\(^1\) These conditions subsequently interact with physiologic determinants involving mainly vascular and coagulation components, resulting in severe renal parenchymal damage.\(^1\)\(^-\)\(^4\) The occlusion of afferent arterioles and interlobular arteries in the cortical vasculature may result from either prolonged vasospasm, with secondary thrombosis, primary vascular damage with thrombosis or some combination of both.\(^1\) Even this theory, however, does not fully explain why renal cortical vasculature alone is involved.

Renal biopsy was considered the gold standard for diagnosis, and reveals necrosis of the entire cortex with a thin rim of viable renal parenchyma in the peripheral subcapsular region.\(^1\)\(^-\)\(^4\) The subcapsular rim of cortex is spared because of collateral circulation from capsular vessels. The renal medulla is not involved. However, because percutaneous renal biopsy is occasionally not possible due to a patient's unstable condition or persistent abnormal clotting, an early noninvasive diagnosis of ARCN has been extremely difficult.

CT findings of ARCN, i.e. 1) a lack of cortical enhancement in the arterial phase CT despite normally enhanced renal arteries and branches, and 2) well-enhanced renal medulla with a narrow subcapsular cortical enhancement in the parenchymal phase CT, are quite indicative, and these represent pathological findings well.\(^1\)\(^-\)\(^4\) To the best of our knowledge, no other renal disease shows similar CT findings, and we think that these findings in ARCN obviate the need for renal biopsy. Although renal artery occlusion should be differentiated from ARCN, renal arteries and their branched are normally opacified in enhanced CT in ARCN.

**References**