Acta Med. Nagasaki 42 : 60−62

Renal Oncocytoma Associated with Long-Term Hemodialysis

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A 50-year old woman was admitted to our hospital for further evaluation of the right renal tumor. She had been on maintenance hemodialysis for 12 years. Computed tomography (CT) and magnetic resonance imaging (MRI) revealed a large right renal tumor. There was no central stellate scar. Angiography showed hypervascularity and tumor staining . With the pre-operative diagnosis of renal cell carcinoma, right nephrectomy was performed. The pathological diagnosis was renal oncocytoma.

Key words : Renal oncocytoma, Hemodialysis, CT, MRI, Angiography

Introduction

There is a high incidence of renal cell carcinoma among end-stage renal disease patients. However, oncocytoma associated with long-term hemodialysis is very rare. To our knowledge, there are only 5 such previously reported cases in the English literature[1-5]. We present the case of a patient with oncocytoma following long-term hemodialysis.

Case report

The patient was a 50-year-old woman who had been on maintenance hemodialysis for renal failure due to chronic glomerulonephritis for 12 years. A solid mass in the left kidney was incidentally detected by an abdominal computed tomography (CT) during a routine check-up. Physical examination on admission disclosed no abnormality. Laboratory findings included the following values : RBC $340\times10^4/mm^3$ and WBC 4,100/mm^3, Hb 10.6g/dl, Ht 32.7%, platelet count $17.7\times10^4/mm^3$. The total protein was 5.9 g/dl, BUN 20 mg/dl, creatinine 4.2 mg/dl, uric acid 1.7 mg/dl, Na 143 mEq/l, K 3.1 mEq/l, and Cl 106 mEq/l.

On abdominal ultrasonography (US), a 4-cm solid mass was found in the upper pole of the right kidney ; the mass was homogeneous and isoechoic and contained no calcification or anechoic central scar.

Another abdominal CT showed a mass in the upper pole of the right kidney, while both kidneys were small and atrophic with multiple renal cysts. The mass was homogeneous and hypodense in comparison with the normal renal parenchyma. A contrast-enhanced CT taken during the corticomedullary phase showed moderate enhancement in the periphery of the mass, the attenuation of which was similar to that of renal cortex. Contrast-enhanced CT during the nephrographic phase and delayed phase showed a homogeneous enhancement of the mass, except for several non-enhancing foci (Fig. 1).

Magnetic resonance (MR) imaging showed the lesion to be homogeneously hypointense on the T1-weighted image and heterogeneously hyperintense on the T2-weighted image (Fig. 2). There was no central stellate scar on CT or MRI.

Selective right renal angiography and right infra-phrenic angiography showed hypervascularity and tumor staining (Fig. 3). No spoke-wheel pattern suggestive of renal oncocytoma was seen. Our pre-operative diagnosis was renal cell carcinoma. After transcatheter arterial embolization (TAE) via the right renal artery and infra-phrenic artery, a right radical nephrectomy was performed. The resected kidney was atrophic and contained a well-circumscribed tumor with a smooth surface and projecting from the upper pole of the renal parenchyma. A cross-section showed a brown-reddish 4-cm round tumor with a small hemorrhagic center, which was encapsulated with thin fibrous tissue. Microscopically, the tumor consisted of solid nests and trabeculae of epithelial cells showing markedly eosinophilic cytoplasm with uniform and round nuclei and small nucleoli. No cellular or structural atypia was found. The pathological diagnosis was renal oncocytoma.

Discussion

The high incidences of cysts, calcification, and tumors occurring in the kidney under dialysis have been well recognized. In particular, the high incidence of renal cell carcinoma (RCC) associated with end-stage renal disease compared to an age-matched nonuremic population has been emphasized[6,7]. A recent autopsy study of 155 consecutive end-stage renal disease patients found renal cell carcinoma in 2%[6]. While RCC has been found in the linings

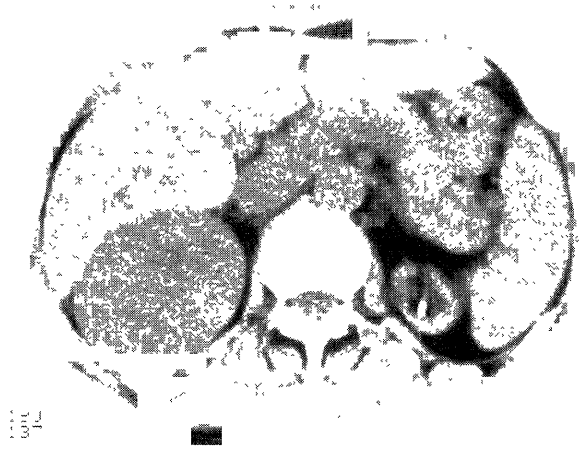

Fig. 1-A

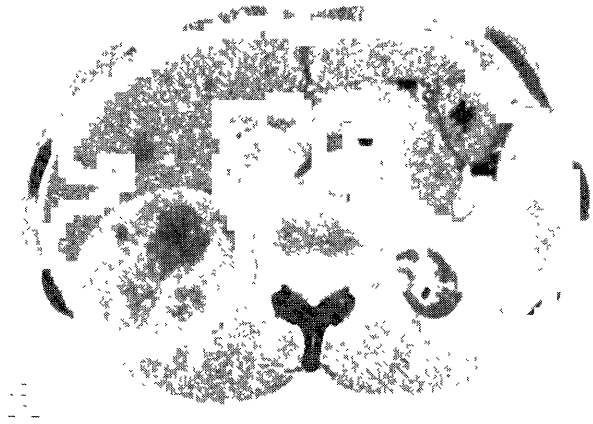

Fig. 1-B

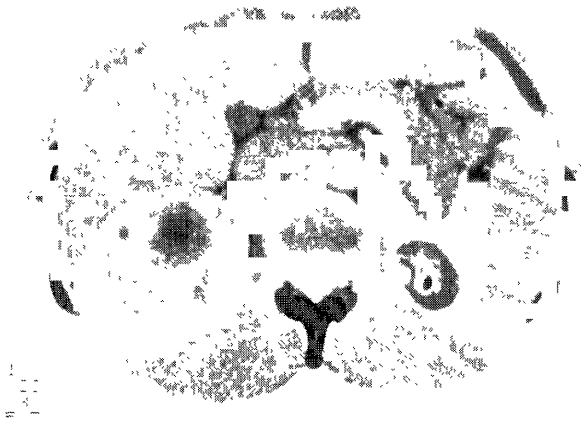

Fig. 1-C

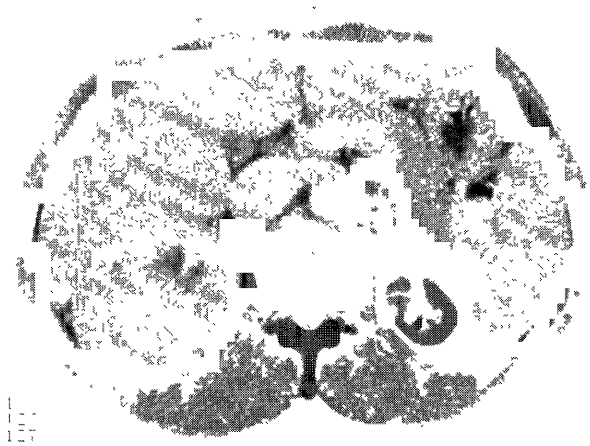

Fig. 1-D

Fig. 1. A. Unenhanced CT showed a mass without fat component in the upper pole of the right kidney. B. Contrast-enhanced CT obtained 35 seconds after the initiation of the contrast injection showed enhancement in the periphery of the mass. C, D. Contrast-enhanced CT obtained 80 seconds and 240 seconds after the initiation of the contrast injection showed parenchymal enhancement. The contralateral kidney was small and atrophic with multiple renal cysts.

Fig. 2-A

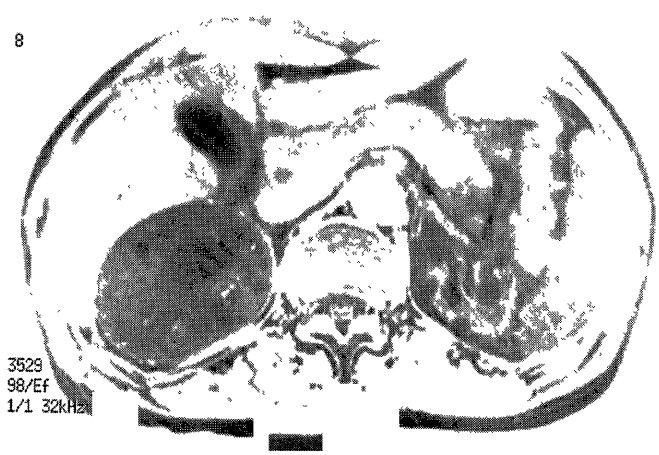

Fig. 2-B

Fig. 2. A. Axial T1-weighted spin-echo MR image revealed the lesion to be homogeneously hypointense. B. Axial T2-weighted image showed the lesion as heterogeneously hyperintense. However, these findings are non-specific.

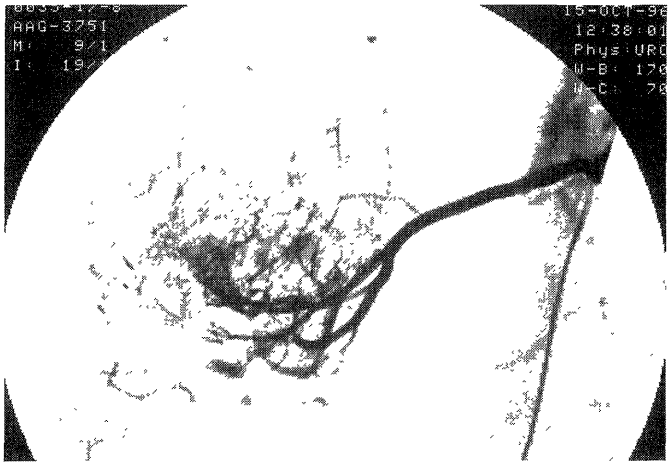

Fig. 3-A

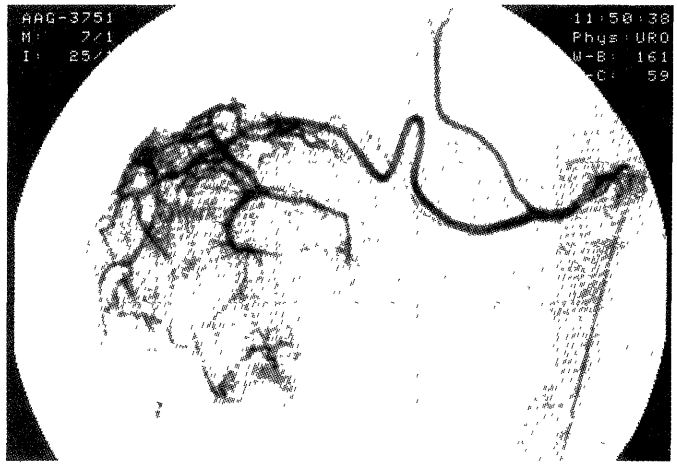

Fig. 3-B

Fig. 3. A, B. Selective right renal and infra-phrenic angiography showed hypervascularity and tumor staining ; however, the spoke-wheel pattern suggestive of renal oncocytoma was not seen.

of acquired cysts, it has also been observed in areas without cyst involvement[1]. A histological progression of the cyst wall from single layered epithelium to epithelial hyperplasia and finally the development of a true RCC was observed[7].

To our knowledge, only 5 previous cases of renal oncocytoma occurring in patients with acquired renal cystic disease have been reported in the English literature[1-5]. It is not presently known whether acquired renal cystic disease is a precursor for renal oncocytoma. However, oncocytic hyperplasia in the wall of a renal cyst was observed[4], which suggests the possibility that renal oncocytoma may originate from the cyst wall itself.

Renal oncocytomas account for 3% to 14% of all renal tumors and were thought to comprise approximately 5% to 7% of the renal tumors classified as RCC before Klein and Valensi reintroduced the diagnosis of renal oncocytoma in 1976[8,9]. Oncocytoma probably arises from the distal renal tubules, and is characterized by well-differentiated epithelial cells with a markedly eosinophilic granular cytoplasm due to its high mitochondrial content. Oncocytomas are composed only of very well-differentiated oncocytes and behave in a generally benign fashion ; however, some malignant-acting renal neoplasms have oncocytic features[9].

Radiographically, a central stellate scar on CT and US suggests the possibility of an oncocytoma. However, this is a poor predictor of oncocytoma or RCC[10]. On MRI, a homogeneous mass of low-signal intensity on the T1-weighted images, increased intensity on the T2-weighted images, the presence of a capsule, central scar or stellate pattern and the absence of either hemorrhage or necrosis suggest oncocytoma, while RCC usually shows intermediate-to-high signal intensity compared to normal renal cortex on T1-weighted images[11]. The angiographic features suggestive of renal oncocytoma include a spoke-wheel configuration in renal tumor, homogenous capillary nephrographic phase, a sharp and smooth margin with a capsule, and the absence of clearly pathologic vasculature. However, renal cell carcinoma may show a similar appearance[12,13].

Since most solid renal tumors without a fat component are malignant, the routine therapy is extrafascial nephrectomy. In patients with suspected oncocytomas with either a missing or hypofunctioning contralateral kidney, partial nephrectomy or local excision may be an adequate therapy. Although the pre-operative diagnosis of renal oncocytoma is generally not easy, as in the present case, we should be aware of the possibility of renal oncocytoma occurring in a patient with long-term hemodialysis.

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