Recovery from renal failure in malignant hypertension associated with primary aldosteronism: effect of an ACE inhibitor

Sir,

Primary aldosteronism is one of the most common causes of secondary hypertension. However, it is rare for this disease to induce malignant hypertension associated with vascular organ damage including renal failure.1 One of the reasons for this is that, even in the malignant phase, renin activity and subsequent angiotensin II production remain suppressed in primary aldosteronism. Here, we report a case with aldosterone-producing adenoma and increased renin activity complicated by malignant hypertension and renal failure, which required haemodialysis therapy. This case is noteworthy, because medical therapy with angiotensin-converting enzyme (ACE) inhibitor effectively improved renal function, allowing discontinuation of dialysis.

A 40-year-old woman consulted a physician on 2 January 2000, complaining of dyspnea, general fatigue, anorexia and headache. The patient appeared drowsy and her blood pressure was 260/140 mmHg. Serum creatinine was 7.1 mg/dl and severe pleural effusion was detected on chest X-ray. Optic fundi exhibited papilloedema and haemorrhage (Keith-Wagener’s grade IV). She was admitted to hospital and treated with antihypertensive drugs and intermittent haemodialysis, which was needed three times a week thereafter. Blood pressure was managed by continuous intravenous infusion of nicardipine, which effectively lowered blood pressure to 170/80 mmHg. As renal function had not improved, the patient was transferred to our hospital 2 weeks later. On admission, her height was 156 cm, weight 44 kg and blood pressure 180/80 mmHg while taking the medication described above. On auscultation, there was systolic ejection murmur at the apex and normal respiratory sounds. There was no abdominal or cervical bruit audible. A complete blood count showed normocytic normochromic anaemia. Arterial blood gas analysis indicated metabolic acidosis (pH 7.398, pO2 93.2 mmHg, pCO2 35.1 mmHg, HCO3 21.2 mmol/l). Serum Na+, K+, Cl−, blood urea nitrogen (BUN) and creatinine levels were 135 mEq/l, 5.3 mEq/l, 97 mEq/l, 74 mg/dl and 7.5 mg/dl, respectively. Plasma renin activity (PRA) was over 20 ng/ml/h (normal: 0.3–2.8) and the plasma aldosterone concentration (PAC) was 480 pg/ml (normal: 35–175). She was diagnosed as having malignant hypertension. Blood pressure was controlled at around 160/80 mmHg with multidrug therapy, which consisted of nifedipine, manidipine, doxazosine and then an ACE inhibitor, temocapril (Figure 1). Renal function improved gradually, and haemodialysis was discontinued (Figure 1). Renal biopsy was performed on 8 March 2001. On histological examination, marked reduction of the arterial lumen by mucoid intimal hyperplasia focally involved by fibrinous matrix was observed, especially in the arcuate arteries and interlobular arteries. Electron microscopy demonstrated wrinkling and folding of the glomerular basement membrane. Plasma cortisol and catecholamines and urinary secretion of 17-OHCS and 17-KS were within the normal range. These findings indicated she had primary aldosteronism. After the diagnosis, spironolactone was administered and blood pressure decreased gradually from 170/80 to 120/70 mmHg. Subsequently, retroperitoneal laparoscopic adrenalectomy was
performed on 29 June 2000. The resected adrenal tissue contained a golden-yellow mass (20×16 mm), consisting of clear cells histologically. Post-operatively, PAC declined sharply to 90 pg/ml and her blood pressure was controlled at around 120/70 mmHg without antihypertensive drugs, except temocapril (2 mg/day). Serum BUN and creatinine decreased to 18 mg/dl and 1.9 mg/dl, respectively (Figure 1). After the patient was discharged, serum creatinine remained at 1.9–2.0 mg/dl for an observation period of one year.

Primary aldosteronism is well known to be associated with extracellular fluid volume expansion and volume-dependent hypertension due to increased aldosterone production, and suppressed PRA. The diagnosis of primary aldosteronism in the present case was confirmed by scintigraphic findings, histological examination of the resected tumour, and the finding that PAC and blood pressure was significantly reduced after the operation although the patient initially had increased PRA. Marked hypertension associated with papilloedema, retinal haemorrhage, cardiac decompensation, rapidly declining renal function and histologically demonstrated arteriolar fibrinoid necrosis as well as onion skin lesion was compatible with a diagnosis of malignant hypertension. Malignant hypertension may occur with any type of hypertension, however, an association with hypertension due to primary aldosteronism is rare, probably due to the suppressed production of angiotensin II, which is a key element in hypertensive vascular injury. Even in the malignant phase, patients with primary aldosteronism have been reported to demonstrate suppressed renin activity. However, there have been several reports describing increased renin activity with primary aldosteronism in the malignant phase, presumably due to more advanced vascular organ damage as seen in the present case. For such patients, immediate therapy is required, because renal failure at presentation is the highest risk factor negatively influencing survival. In the present case, combined anti-hypertensive therapy was effective for lowering blood pressure, but renal function did not recover until the ACE inhibitor temocapril was started (Figure 1). With temocapril, the serum creatinine levels gradually decreased and eventually haemodialysis could be discontinued.

Figure 1. The clinical course in our patient. Initially, blood pressure (BP), plasma renin activity (PRA; ng/ml/h) and plasma aldosterone concentration (PAC; pg/ml) were extremely high. Combined anti-hypertensive therapy was effective in lowering blood pressure and PRA, but renal function did not recovered until the ACE inhibitor temocapril (2 mg/day) was started. With temocapril, serum creatinine (Cr) levels gradually decreased and eventually haemodialysis could be discontinued. Post-operatively, PAC declined to 90 pg/ml and blood pressure was controlled.
aldosteronism and that ACE inhibitor is effective for vascular organ damage in those cases.

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References


