Creutzfeldt disease and of hepatic coma is probably also due to a compensating action in the presence of a disordered dopaminergic system. Taken together, these findings suggest that triphasic waves occurring repetitively and regularly in an E.E.G. are caused by a disturbance of the dopaminergic system.

The question arises whether the hyperkinesia and the coma are caused by disorders of two separate dopaminergic systems. The following considerations support such a view. (1) In the early stages of Jakob-Creutzfeldt disease of the Jones-Nevin type the triphasic wave E.E.G. picture may occur in association with myoclonus but without a disturbance of consciousness. (2) In some cases of slowly developing cerebral infarction myoclonus is an early feature but there is no loss of consciousness. Myoclonus disappears when the patient becomes hemiparetic, which is understandable when it is remembered that Parkinsonian tremor may disappear when a lesion of the internal

capsule occurs. (3) Triphasic waves may appear in a case of rapidly developing hemiplegia without loss of consciousness and disappear after the administration of amantadine.

More supporting evidence is needed before this concept of the cause of triphasic E.E.G. waves can be accepted, and it is to be hoped that this communication will stimulate further investigations.

References

- Braham, J. (1971). *British Medical Journal*, **4**, 212.
 Gubbay, S. S., and Barwick, D. D. (1966). *Journal of Neurology, Neurosurgery and Psychiatry*, **29**, 459.
 Pampiglione, G., and Lehovský, M. (1968). *Clinical Electroencephalography of Children*, ed. P. Kellaway and I. Petersén, p.287. Stockholm, Almqvist and Wiksell.
 Parkes, J. D., Sharpstone, P., and Williams, R. (1970). *Lancet*, **2**, 1341.
 Schwartz B. A., and Seguy, M. (1970). *Revue Neurologique*, **122**, 535.

MEDICAL MEMORANDA

Bilateral Renal Carcinoma associated with Polycystic Kidneys

P. F. ROBERTS

British Medical Journal, 1973, **3**, 273-274

The frequency with which renal carcinoma develops in polycystic kidneys is not accurately known, but on reviewing the literature it appears to be more common than usually credited. The purpose of reporting this case is to remind clinicians of this complication, which is particularly important because of the longer survival of patients with this condition due to improvements in the treatment of hypertension and chronic renal failure. It raises the question of how early bilateral nephrectomy should be considered in these patients.

Case Report

The patient, a 44-year-old accountant, was admitted to the Radcliffe Infirmary with a three-month history of malaise and night sweats. For five days he had been vomiting and suffering from colicky, hypogastric pain. He was known to have had bilateral polycystic kidneys for 16 years and had been treated for hypertension with methyl dopa during the previous three years. There was no family history of polycystic disease. Over the previous year he had had, for the first time, several bouts of haematuria.

On examination he was found to be pale, dehydrated, and unwell, with a fever of 38.3°C and bilateral ankle oedema. The pulse was 92/min, sinus rhythm, and the blood pressure 120/80 mm Hg, with a pulmonary systolic ejection murmur. No adventitious sounds were heard in the lungs. Abdominal palpation showed massive enlargement of both kidneys, more marked on the right side, where the lower pole was fixed. Blood urea was 82 mg/100 ml, and I.V.P. showed loss of the middle calices on the right side with calcification in the renal shadows. Renal angiograms showed increased, abnormal vascularity in the middle of the right kidney, indicative of a neoplasm. Chest x-ray examination showed bilateral nodular tumour deposits in the lung fields. In view of these findings he was treated with medroxypro-

gesterone 100 mg twice daily. His condition deteriorated, however and he died three weeks later.

NECROPSY FINDINGS

The body was that of a thin, pigmented man with abdominal distension. Internal examination showed no abnormality in the brain. The lungs contained scattered, discrete, rounded tumour nodules in all five lobes. The heart showed mild left ventricular hypertrophy. The kidneys were grossly enlarged due to polycystic disease. The left kidney (fig. 1) contained a partly encapsulated haemorrhagic tumour 6 cm diameter in the upper pole (a). Opposite the middle calices was a 2-cm, grey, solid nodule of tumour tissue (b). The middle portion of the right kidney (fig. 2) was virtually replaced by an irregular, grey,

FIG. 1—Left kidney showing two foci (a and b) of tumour infiltration. FIG. 2—Right kidney showing two foci (c and d) of tumour infiltration.

partly necrotic tumour about 12 by 10 cm (c). In the upper pole there was a 1.5-cm, rounded, yellow tumour nodule (d). The renal veins were free of tumour. Examination of the remaining organs showed polycystic disease of the pancreas and further tumour metastases in the para-aortic lymph nodes.

Tissue sections from sites (a) and (d) in the kidneys showed the characteristic appearance of a clear-cell carcinoma of the kidney (fig. 3). Tissue from sites (b) and (c) showed the presence of an un-

FIG. 3—Clear-cell pattern of renal carcinoma. (Haematoxylin and eosin. $\times 213$.)

FIG. 4—Spindle-cell pattern of renal carcinoma. (Haematoxylin and eosin. $\times 243$.)

differentiated, spindle-cell tumour with a sarcomatous pattern associated with the deposition of collagen and reticulin fibres (fig. 4). In several places groups of multinucleated giant cells were seen. Many of the tumour cells contained abundant glycogen granules in the cytoplasm, but no fat was shown. There was no bone or cartilage formation. These two types of tumour cells were entirely distinct, with no transitional cell types in the intervening tissue. In view of this it was interesting to find that sections from the metastases in the lymph nodes and lungs were of a uniformly sarcomatous pattern, with no clear-cell elements.

Comment

The recognition during life of a tumour supervening on polycystic kidneys can be a difficult problem. In this case the presence of renal calcification and the I.V.P. and angiographic appearances led to the correct diagnosis being made. The association of renal carcinoma with polycystic kidneys has been noted for many years. Howard and Young (1969) referred to 17 cases in the literature and added one of their own. Siegelman *et al.* (1971) reported a case of renal carcinoma and polycystic kidneys associated with neurofibromatosis. Borski and Kimbrough (1954) reported a case of bilateral renal carcinoma in association with polycystic kidneys, but there was an interval of three years between the appearance of tumour in each kidney. Also the patient developed a cerebral metastasis in the interval. The present case, therefore, is unique in that there appeared to be simultaneous tumour formation in both kidneys.

The presence of the two varieties of renal carcinoma in both kidneys tends to support the view that the malignant change was multicentric in origin rather than metastatic from a primary focus.

Polycystic kidneys can now be treated successfully by dialysis and by renal transplantation. The risk of developing malignancy in these kidneys is as yet undetermined. If it proves to be a significant risk, then the question of prophylactic nephrectomy should be considered at an early stage in the treatment of these patients.

I should like to thank Dr. E. M. Buzzard, consultant physician, Radcliffe Infirmary, Oxford, for permission to report this case.

References

- Borski, A. A., and Kimbrough, J. C. (1954). *Journal of Urology*, 71, 677.
- Howard, R. M., and Young, J. D. (1969). *Journal of Urology*, 102, 162.
- Siegelman, S., Zavod, R., and Hecht, H. (1971). *New York State Journal of Medicine*, 71, 2431.