Renal Artery Stenosis due to the Vascular Lesions of Rejection in Cadaveric Allografts

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Vascular lesions play an important part in allograft rejection and may be seen in vessels of all sizes (Porter et al, 1963; Kincaid-Smith, 1967).

We observed lesions in main renal arteries in renal allografts removed because of rejection or examined at autopsy and this led us to do renal arteriograms in certain patients with renal allografts.

ARTERIOGRAPHIC FINDINGS
Renal arteriograms were performed in 26 patients selected on the basis of unexplained hypertension or deteriorating renal function. Twenty of the 26 patients showed stenosis in the main renal artery or its branches or related to the anastomosis between host and graft vessels. Twenty of 23 arteriograms done more than a week after renal transplantation showed major arterial lesions.

In the 3 patients in whom localized strictures were present in the common iliac vessel these occurred at the upper and lower ends of the cuff of donor aortic tissue anastomosed to the common iliac artery (Figure 1). The technique used in these patients was that described by Johnson et al (1965).

In one patient a renal artery aneurysm was present, but this was not satisfactorily demonstrated on the arteriogram. Four patients showed severe main renal artery stenosis, 3 moderate stenosis and 7 had mild stenosis. Two patients showed stenosis of branches of the renal artery without definite main renal artery lesions. Stenosis was classified as severe if it narrowed the lumen by more than 2/3 and mild if the narrowing of the lumen was estimated as less than 1/3. Intermediate degrees of stenosis were classified as moderate.

In half the cases the endothelial lining appeared smooth on the arteriogram and in the other half it appeared irregular. Irregular lesions often extended over several centimetres (Figure 2) and showed areas of stenosis in branches as well as in the main renal artery. All eight patients in whom the
endothelial surface appeared irregular had arteriograms within 6 months of grafting. Seven of these eight patients had uncontrolled rejection and died or had their allografts removed. Marked progression of multiple main renal artery lesions was noted over a six week period in one patient. In another patient an irregular renal artery lesion somewhat similar to fibromuscular hyperplasia was detected six weeks after operation and was still present but far less pronounced 3 years later.

Only one of the patients with a smooth stenosis has had the kidney removed and in another patient the stenosis was corrected surgically and thus the renal artery was available for histological examination.

PATHOLOGICAL FINDINGS
In the above 7 patients with irregular lesions and 2 patients with smooth renal

Figure 1. Severe stenosis of the smooth type 6 months after transplantation. This was associated with severe hypertension which responded to surgical correction of the stenosis.
artery lesions the renal artery was examined histologically and compared with lesions in the kidney at the same time.

In every instance the main renal artery showed lesions similar in appearance to the vascular lesions of rejection throughout the grafted kidney. The pathological changes varied in different patients depending upon the time of nephrectomy or death and the severity of the rejection process, but the lesions in the main renal artery always resembled the well recognized lesions of rejection in the smaller vessels. The degree of fibrosis, amount of foam cell infiltration, type of cells present and age of the lesion were similar in large and small vessels in the same kidney in 9 renal allografts.

In a further 9 renal arteries examined at autopsy or at the time of nephrectomy similar lesions were invariably present. These commenced abruptly at the site of anastomosis and a considerable increase in intimal tissue was noted in two patients in whom no definite stenosis was noted in
the renal arteriogram. Vascular lesions of rejection were also invariably present in the kidneys from these patients. In two patients in whom the allografts were removed 15 days and 8 weeks after grafting, in spite of several episodes of severe rejection, vascular lesions of rejection were not present in main renal arteries, or in smaller vessels in the kidney. These kidneys were known to be badly mis-matched with the recipients who had shown clinical and renal biopsy evidence of repeated acute rejection. Both kidneys should therefore have shown extensive vascular changes of rejection. Both these patients were treated continuously with dipyridamole and anticoagulants from the 5th day after operation until removal of the graft.

As the vascular lesions of rejection in small and large renal vessels can be shown to result from thrombosis and organization of thrombi (Kincaid-Smith, 1967) it seems likely that the dipyridamole and anticoagulant treatment prevented progressive narrowing of the renal vessels which would usually be present in such kidneys (Kincaid-Smith, unpublished).

DISCUSSION

The very high incidence of renal artery stenosis in patients on whom we did renal arteriograms is surprising in view of the small number of cases recorded in the literature. Some previous cases have shown localized lesions at the site of anastomosis perhaps more likely to be related to surgical technique than to the lesions of rejection (Papadimitriou et al, 1969).

When, however, one considers that at the present stage cadaver transplants are almost always mis-matched to some extent all kidneys might be expected to show some histological evidence of vascular lesions of rejection; this has indeed been our experience, with the exception of the patients treated with anticoagulants quoted above. In order for lesions in the main renal artery to be apparent on an arteriogram, considerable intimal thickening due to rejection changes must be present, thus the incidence of histological lesions in the main renal artery is very much higher than the incidence of radiographic stenosis.

Although the histological appearance of the intimal tissue in small and large vessels is similar, the degree of narrowing may vary considerably. As with other vascular lesions which depend upon deposition and organization of mural thrombi the lesions were more pronounced in areas where anatomical lesions would favour turbulence. Thus at an acute bend in a main renal artery severe stenosis may be seen, although only slight narrowing and relatively mild rejection changes are present in branches throughout the kidney. In such a patient surgical correction of the main renal artery lesion may be indicated. Hypertension was most frequently observed in patients with severe stenosis and in one patient hypertension was cured by surgical correction.

The high incidence of renal artery stenosis in our patients may in part
be due to their selection on the basis of features which made us suspect renal artery stenosis. However, the 20 cases represent almost a third of our total series of 75 cadaveric allografts. As 70% of our patients who received transplants more than 2 years ago are well with functioning grafts and 6 arteriograms were done more than 2 years after grafting, some cases of renal artery stenosis in our series may represent late complications of cadaveric renal transplantation.

REFERENCES

Kincaid-Smith, P. (1967) Lancet, ii, 849