RESULTS OF MEDICAL VERSUS SURGICAL TREATMENT OF RENOVASCULAR HYPERTENSION

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SUMMARY

1. An analysis has been made of a series of hypertensive patients with renal artery stenosis treated medically.
2. Patients presenting with features of vascular disease other than renal had a high morbidity and mortality despite treatment; nevertheless, in these, medical as opposed to surgical treatment is advised.
3. No particular drug emerges as better than any other in individual patients.
4. Patients over 40 years of age are in general more suitable for medical than surgical treatment.

Key words; renovascular hypertension, fibromuscular hyperplasia, atheroma, renin.

It is not possible adequately to compare medical and surgical treatment in hypertension due to renal artery stenosis since this would demand that a proper trial with random allocation to surgical or medical treatment be carried out, and as far as I know this has never been done. This means that selection of cases undoubtedly occurs and the dividing point is that surgery is carried out preferably, and usually on young patients with fibromuscular stenosis and relatively little evidence of atheromatous vascular disease or hypertensive damage elsewhere, whereas medical treatment is used for the remainder who do not answer to this category and often for those in the older age group whatever may be the findings. Any statements that I might make therefore have to be very tentative. For the purposes of this discussion, I would like to consider the following points.

(a) The type of patient treated medically in respect of age, sex and cardiovascular complications.
(b) Morbidity and mortality.
(c) Medical treatment of 'failed surgery'.
(d) Surgical treatment of 'failed medical'.

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(a) The type of patient treated medically in respect of age, sex and cardiovascular complications

In a previous consideration of these patients (Peart, 1967), out of forty-eight patients, thirty-three had unilateral main artery stenosis, of which four had the appearance of fibromuscular hyperplasia; six had a stenosis in a branch of the renal artery; nine had bilateral stenosis in a branch of the renal artery; nine had bilateral stenosis, four of these being associated with fibromuscular hyperplasia. In comparison with the surgical cases treated over the same period, there was no great difference in the age range although in the last 5 years the number of patients treated with fibromuscular hyperplasia at a younger age has decreased the average age in the surgically treated group. Nevertheless, if that particular group is removed from consideration, then the age scatter in the surgical and medical cases is roughly the same.

(b) Morbidity and mortality

Various treatments have been used and over time newer drugs have been introduced, but in common with hypertension of no known cause, no particular drug emerges as being basically any better than another in individual patients. It is again difficult to be certain that the degree of control achieved is any better or worse than the comparable group treated without underlying renal disease, and there is no doubt that patients with apparently similar degrees of unilateral stenosis can be very responsive to medical treatment on the one hand or very unresponsive on the other, which is exactly the same situation as in any form of hypertension. It does not, therefore, follow that lowering the perfusion pressure to the kidney by drug treatment leads to an increased pressor response from the kidney and a restoration of the previous higher blood pressure level. This I would suggest is the common pattern (Dustan, Page, Poultasse & Wilson, 1963; Dustan, Meaney & Page, 1966; Sheps, Osmundson, Hunt, Schirger & Fairbairn, 1965) but some patients are very resistant and each time the pressure is lowered it only seems to stay down for a short time, to be succeeded by further increase, and so on. In turning to the morbidity and mortality of medical treatment, it can be seen that deaths occur at all levels of pressure (Peart, 1967) and that it would take larger numbers to establish whether they were different from any other group of hypertensive patients, and certainly in comparing medical and surgical patients, though this is of doubtful validity in view of the objections mentioned earlier, there is little to distinguish the groups of patients. Coronary artery, cerebrovascular and renal disease take their quota in the medical and surgical cases. The most impressive and least surprising finding is the very high mortality and morbidity in those patients presenting with symptoms of vascular disease at the commencement of treatment, whether this was disease of peripheral blood vessels of the heart or of the brain (Peart, 1967). It is perhaps the best argument for early treatment of hypertension by any means before the development of these complications of hypertension. It is also an argument in favour of treating such a high risk group by medical means, since the incidence was the same in the surgical group; and also included deaths in close relation to the operation (Dustan et al., 1963; Peart, 1967).

(c) Medical treatment of 'failed surgery'

The surgical failure in renal artery stenosis may be of two types: the first, in which there is an ultimate technical failure to increase the blood supply to the kidney; the second, where, despite improvement of blood supply, the blood pressure has not returned to normal and there is presumably either disease of the opposite kidney or some other cause of hypertension with
secondary renal change. Again the patients in this situation do not seem to be more or less difficult to control than any other form of severe hypertension, but there is a special group in which the failure is only relative. This is where even though surgery has not reduced the blood pressure to normal or even in some cases at all, the patients become more sensitive to the effects of hypotensive drugs. Attention was called to this group of patients first by Dustan and her colleagues at the Cleveland Clinic (Dustan et al., 1963) and there is no doubt that many fall into this category. It has to be recognized that in some patients many months have to elapse after surgery before the pressure does finally drop to its lowest point, but this is readily seen by an increasing sensitivity to the same dose of drugs leading, in some cases, to their eventual withdrawal. It is not that group which is of interest so much as those who always require a drug but are more sensitive after operation. In these the function of the supposedly normal kidney is of importance (Stamey, 1966) and it could be shown that the absence of tubular atrophy, of hyperplasia of the juxta-glomerular apparatus and arteriolar hypertrophy and hyalinization were features which suggested that increased drug sensitivity would be present, the same features which indicated a probable good response to renal arterial surgery (A. Rawson, K. Owen, R. A. Parker & W. S. Peart, unpublished work).

(d) **Surgical treatment of failed medical**

Some patients who are very resistant to medical treatment can have dramatic results with surgery. They may fall into the group where reduction of the perfusion pressure does lead the kidney to become more pressor in its effects. This has perhaps been brought into great prominence in end-stage renal failure where medical treatment, whatever its intensity and often associated with very severe sodium depletion induced by dialysis, has failed. In these patients the plasma renin activity and angiotensin are at very high levels, as in some patients with renal artery stenosis and malignant hypertension, and in both groups of patients the pressure may be reduced abruptly either by nephrectomy or by renal artery reconstruction. The usual rules which say that the presence of renal failure and severe hypertension with renal artery stenosis constitutes an absolute contra-indication to surgery, have to be regarded with caution and the following cases are illustrative. The first patient who was shown to have a renal artery stenosis as a cause of his hypertension, was successfully treated by surgery, which meant nephrectomy in his case. His pressure stayed down and then rose after a year or two when a further new stenosis was discovered in the artery of his remaining kidney. He was treated with drugs and his pressure maintained at adequately low levels. He then died of a myocardial infarct. The next patient, who first presented with malignant hypertension and pulmonary oedema, had hypertension for over 20 years, first discovered when he was aged 20 years. He was completely resistant to a whole range of drugs and was in perpetual cardiac failure. His serum creatinine was raised, as was his blood urea, and his outlook appeared hopeless. A left-sided renal artery stenosis was found with presumed vascular damage on the opposite side leading to an over-all creatinine clearance of 7 ml/min at the worst. Despite the apparent contra-indications, a by-pass operation was carried out on his renal artery, his pressure fell, he came out of cardiac failure, the creatinine clearance rose to 35 ml/min, and he now needs a much lower dose of drugs. He is able to carry out his occupation as a doctor with a blood pressure around 150/100 mmHg sitting and standing. The final case of interest is a patient who 6 years before had presented with severe hypertension of the order 260/160 mmHg and bilateral retinal haemorrhages. Renal arteriography had failed to show any stenosis in the renal arteries
and renal function was good with a serum creatinine of 1 mg/100 ml and a blood urea of 35 mg/100 ml. She was in and out of hospital with medical treatment largely failing to control her blood pressure and with an inability on her part to take the drugs because of side-effects. A further renal arteriogram 4 years later showed that renal artery stenosis had now developed on the right side and despite the feeling that this had to be a secondary phenomenon playing little part in her maintained hypertension, unilateral nephrectomy was followed by easy control of the blood pressure at normal levels with small doses of the same hypotensive agents that had failed previously.

There has been a great deal of dispute about the effort expended in finding patients with renal artery stenosis in which the investigations to be carried out, such as divided renal functional studies or arteriography, are unpleasant and may even carry risks of their own. It is therefore essential at the present time to see what type of patient might really benefit, for there is no doubt at all that an operation to increase the blood flow to an ischaemic kidney or to remove that kidney can cure the hypertension. The question is, how often and in whom? A personal view follows.

(1) Having heard the history and examined the patient, if the answer to the doctor’s question, ‘Am I looking for a cure?’ is, ‘Yes’, then all the investigations needed in the investigation of hypertension are justifiable.

(2) The major contra-indication to operation and therefore to full investigation is the presence of major vascular disease elsewhere. This includes especially myocardial ischaemia or infarct, intermittent claudication and stroke. Operative mortality in patients exhibiting the latter condition is high, as is subsequent morbidity and mortality.

(3) The success rate of operation is much better in everybody’s hands under the age of 40 years than over, even if success can be achieved at any age. This may reflect, but not certainly, the duration of hypertension and the degree of vascular damage in the opposite kidney or elsewhere.

(4) A successful result for surgery, assuming a proper restoration of the blood supply, or nephrectomy, may only be expected if the following conditions are fulfilled.

(i) A pyelogram with delayed appearance on the affected side with an increasing concentration of dye in a small volume pelvis and a kidney which is smaller than the opposite one.

(ii) Over-all renal function which is normal, i.e. creatinine clearance close to 100 ml/min, $p$-aminohippurate (PAH) clearance close to 450 ml/min, and serum creatinine close to 1 mg/100 ml.

(iii) A normally functioning opposite kidney, i.e. creatinine clearance in that kidney greater than 50 ml/min and PAH clearance greater than 200 ml/min.

(iv) A raised peripheral plasma renin activity level and an increased concentration of plasma renin activity from the stenosed kidney compared with the normal.

(v) The presence of juxtaglomerular cellular hyperplasia on the stenosed side with atrophy on the normal side and especially a lack of vascular damage and tubular atrophy on the normal side.

(References: Stamey, 1966; Statistical Report, 1966; Peart, 1967; Page & McCubbin, 1968)

It will not be possible to follow all these criteria in any one patient, but if all are present and the histology from a biopsy at operation is in agreement, then the prospects for cure of hypertension can be excellent. In the group of patients under 40 years who have fibromuscular
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hyperplasia of one renal artery, where the criteria above are fulfilled as far as the functional state of the kidney is concerned, and even omitting renin activity measurements, at least 90% should expect a cure. In the older age group with atheromatous vascular disease, where there is uncertainty that the stenosis is primary and not secondary to hypertension and atheromatous vascular disease, then the cure rate drops. This is a universal experience and perhaps means that more effort should be expended in the younger age group in picking out those with curable hypertension. It is also well to remember that even if the blood pressure is not completely restored to the arbitrary normal level of 120/80 mmHg by such an operation, the pressure may be considerably lowered, which is obviously an advantage.

REFERENCES


