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FUTURE PLACE OF LUMBAR SYMPATHECTOMY IN OBLITERATIVE VASCULAR DISEASE OF LOWER LIMBS

BY

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With the steady increase in the popularity of direct arterial surgery, in the form of grafting or disobliteration, the place of lumbar sympathectomy by itself in the treatment of obliterative vascular disease of the lower limbs is uncertain. It therefore seems worth while to consider the future status of this operation in the light of the results it achieves. The following observations are based on a review of 100 consecutive cases of obliterative disease followed up for between one and seven years (Table I) after lumbar sympathectomy. All the patients except two were

TABLE I.—Interval Between Operation and Review in 100 Consecutive Patients

Interval in years	1-2	2-3	3-4	4-5	5-6	6-7
No. of patients	35	22	13	9	16	5

Note.—25 of the patients were dead and 2 untraced by the time of review.

TABLE II.—Reason for Sympathectomy in the 100 Patients

Ischaemic skin lesion or rest pain without claudication	14
„ „ „ „ with „ „ „ „	27
Uncomplicated claudication	59

traced, and follow-up examination was carried out personally on all the survivors.

The various reasons for operation are set out in Table II, and the results achieved are discussed under four headings: (1) sympathectomy and intermittent claudication; (2) sympathectomy and limb survival; (3) life prognosis after sympathectomy; and (4) the selection of patients for sympathectomy.

Sympathectomy and Intermittent Claudication

Intermittent claudication was complained of by 86 of the 100 patients. It is a predominantly male symptom, there being in the present series 6.6 males to each female. Contrary to the widely held belief that atherosclerosis is a disease of old age, the mean age at onset of the symptom was 52 years. Moreover, as illustrated in the Chart, there was a striking rise in the incidence after the age of 45. Indeed, claudication

may be encountered in patients in their late twenties or thirties, and the early age of onset makes it a symptom of great importance.

Claudication is felt typically in the calf, this being the site in 93% of the patients who complained of it (Table III). Calf pain may be associated with buttock or thigh pain in patients with high arterial occlusions, and sometimes it is associated with pain in the foot. In only 7% of the patients was pain limited to the small muscles of the sole, which is perhaps surprising as these muscles are constantly in contraction during weight-bearing to assist in maintaining the longitudinal arch of the foot. By the time most of the patients were originally seen they were being forced to stop by the pain, and the claudication distance most commonly was 100 to 200 yards.

Age at onset of claudication in the 86 patients suffering from this condition.

TABLE III.—Site of Pain in 86 Patients Suffering from Intermittent Claudication

Site of Pain	No. of Patients
Buttocks, thigh, and calf	8
Calf only	60
„ and foot	12
Foot only	6

How Far Were the Patients with Intermittent Claudication Benefited by Sympathectomy?

Of the surviving non-amputated patients attending for review, 47 had been sympathectomized for claudication uncomplicated by skin lesions. These patients were therefore specially questioned about any improvement after operation. Twenty-one claimed that their claudication had been improved and 26 were emphatic that they had not been benefited in this respect. This suggests that a little under half the patients were improved by operation. However, more critical consideration of the 21 patients claiming benefit revealed positive improvement in only six, or 13%. A number of the patients who had claimed an increase in their walking distance admitted, on further questioning, that they had learned to walk much more slowly, and that if they walked as quickly as they had done before operation claudication pain came on as rapidly. Other patients did not claudicate after operation simply because claudication in the other leg, or anginal pain, forced them to stop before the pre-operative claudication distance for the sympathectomized leg was reached.

Blood-flow measurements, both at rest and in activity, and in limbs with normal and with occluded arteries, certainly give no support to the view that sympathectomy produces more than a transitory increase in muscle blood-flow (Grant and Holling, 1938; Wilkins and Eichna, 1941; Stein, Harpuder, and Byer, 1948; Shepherd, 1950; Dornhorst and Sharpey-Schafer, 1951; Duff, 1951; Barcroft, Dornhorst, McClatchey, and Tanner, 1952). The great difficulty in assessing the effect of treatment on such a purely subjective symptom as intermittent claudication lies in the fact that it is prone in its natural history to wide spontaneous fluctuations in severity. This is what makes the value of sympathectomy in the treatment of intermittent claudication such a

controversial subject, leading clinical authorities like Learmonth (1950) and Smithwick (1957) to hold opposing views on its efficacy. Even in the 13% of patients whose claudication had apparently been improved by sympathectomy, it is impossible to say to how great an extent the improvement was due to a spontaneous remission rather than to operation. Fortunately, to-day, direct attack on the diseased vessels will often permit more certain cure of claudication to be achieved. On balance, considering blood-flow studies and personal clinical experience, it seems that sympathectomy should not be recommended in the patient with uncomplicated intermittent claudication.

Sympathectomy and Limb Survival

Of the 100 patients, 41 presented with an ischaemic skin lesion or rest pain. Twenty-five of these also gave a history of intermittent claudication; but where cutaneous ischaemic change is present the primary aim of treatment is to prevent gangrene, and the success of treatment is dramatically demonstrated by the major amputation rate. In 55% of these patients the skin lesion healed after sympathectomy, and major amputation has not so far been required.

Selection of patients is the most important factor influencing the limb recovery rate after sympathectomy in those with skin lesions. If the foot, as distinct from the toes, is involved in frank gangrene, then amputation is inevitable whether or not a sympathectomy is carried out. When such cases are included in a series the amputation rate is high. If sympathectomy is restricted to patients with minimal digital gangrene, then the major amputation rate will be low. In the present series of 100 cases the overall major amputation rate was 15%, and it was 45% in the patients presenting with a skin lesion or rest pain. (The figure of 15% does not include two patients with unilateral sympathectomies who had a major amputation of their non-sympathectomized limbs.)

Limb Prognosis After Sympathectomy Related to the Pre-operative Clinical Course

There appear to be three distinct types of clinical course in relation to limb prognosis. Firstly, for example, of the 15 patients coming to a major amputation after sympathectomy for an ischaemic skin lesion, 11 required amputation within two months of sympathectomy, two more required it within five months, and in only two was the interval between the two operations more than a year. Of great interest was the fact that these patients coming to early amputation usually gave a very brief history prior to presenting with a skin lesion. Frequently there was no history of claudication. They therefore seem to have had a fairly acute type of illness, the clinical course being uninfluenced by sympathectomy and the limb progressing rapidly to gangrene. Edwards and Crane (1956) in their long-term follow-up studies noted that when amputation was required after sympathectomy it was usually required soon after. If a patient does not need amputation within six or so months of sympathectomy then he has a good chance of never needing it.

The second type of clinical course is that seen in patients with a long history of intermittent claudication who never develop a skin lesion. In none of the patients in the present series who were sympathectomized for uncomplicated claudication has a major

amputation become necessary. It is impossible to say whether any of them would have come to amputation even had they not been sympathectomized.

Somewhere between these two clinical courses—the one leading to early amputation in spite of treatment and the other rarely leading to gangrene—lies a group of patients who give a long history of claudication but who at some time develop a minimal skin lesion. Often this is the result of local trauma. It is in this group of patients that lumbar sympathectomy might be expected to produce the best results, and in the present series they certainly fared best.

Measurements of blood flow, even in obliterative arterial disease (Gillespie, 1960), leave little doubt about the efficacy of lumbar sympathectomy in producing a lasting increase in blood flow in the foot, with protection from reflex vasoconstriction to environmental cold. This is likely to be of great importance in promoting the healing of existing skin lesions and the prevention of further ones. Certainly, the relief of rest pain by sympathectomy may be dramatic proof of the effect of operation.

The number of diabetic patients in this series was too small to allow them to be considered separately, but the greater incidence of skin lesions in diabetes is well documented and their limb prognosis is more grave (Edwards and Crane, 1956).

Life Prognosis After Sympathectomy

Obliterative vascular disease is rarely limited to the periphery, and these patients frequently have associated disease in the coronary or cerebral vessels which may be the cause of death at any time. Twenty-five of the 100 patients were dead by the time of review. The actual figure for the death rate in any series of patients, however, will greatly depend, as does the amputation rate, on selection of patients for operation as well as on the length of the follow-up period. If a high proportion of the patients in a series are sympathectomized for extensive skin lesions at an advanced age then the mortality will be greater than that in a series of younger patients operated on for uncomplicated claudication. Similarly, if diabetic patients are not included then the survival figures will be better.

However, even in the present series of cases, where a fairly conservative attitude towards sympathectomy for skin lesions in the elderly was adopted, the overall mortality of 25% within one to seven years of operation is strikingly high. Also, the mean age at death was only 57 years, and the mean survival time after sympathectomy just over two years (Table IV). There was no significant difference in the age at operation or at death between the 13 patients with a skin lesion or rest pain at the time of operation and the 12 patients operated on for uncomplicated claudication.

Cause of Death after Sympathectomy.—The cause of death in each of the 25 patients was ascertained (Table IV). Nine deaths were due to a cerebral vascular accident, seven to a myocardial infarction, and five either to a vascular cause or to bronchopneumonia after amputation. Only four of the deaths were from some cause unrelated to arterial disease, three being due to malignant disease and one to small-bowel obstruction.

Coexistence of Peripheral, Coronary, and Cerebral Artery Disease.—This and other reviews (Richards,

TABLE IV.—*Some Details of the 25 Dead Patients*

Interval between Operation and Death (Years)	Age at Death	Certified Cause of Death
13 Patients with a Skin Lesion or Rest Pain at Time of Sympathectomy		
1	65	Cerebral haemorrhage
4	75	Cardiovascular degeneration
3	59	Myocardial infarction
2	54	Cerebral haemorrhage
$\frac{1}{2}$	61	Small-bowel obstruction
1	64	Bronchopneumonia after amputation
$\frac{1}{2}$	52	Arteriosclerosis, diabetes, and pyelonephritis
$\frac{1}{2}$	52	Bronchopneumonia after amputation
3	65	Cerebral haemorrhage
1	58	Myocardial infarction
2	57	Cerebral haemorrhage
$\frac{1}{2}$	74	"
$\frac{1}{2}$	55	Myocardial infarction
12 Patients Sympathectomized for Uncomplicated Claudication		
5	69	Cerebral haemorrhage
2	52	Carcinoma of bladder and renal failure
$3\frac{1}{2}$	61	Myocardial infarction
$1\frac{1}{2}$	59	Subarachnoid haemorrhage
1	60	Bronchial carcinoma
$3\frac{1}{2}$	55	Cerebral haemorrhage
3	57	Carcinoma of rectum
1	56	Cerebral haemorrhage
1	67	Myocardial infarction
1	63	"
$2\frac{1}{2}$	42	Pulmonary embolus
5	51	Myocardial infarction

1957) have revealed a strikingly high incidence of coronary and cerebral artery disease in patients presenting with symptoms of peripheral obliterative vascular disease. 64% of the deaths in the present series were due to a coronary or cerebral vascular accident.

Evidence of coexisting coronary and cerebral artery disease was also sought in the 65 surviving non-amputated patients. Thirty-four of them, or 53%, had suffered a cerebral vascular accident or a myocardial infarction, had complained of angina, or had electrocardiographic changes suggestive of myocardial ischaemia (Table V). This close association of coronary

TABLE V.—*Evidence of Coronary or Cerebral Artery Disease was Present in 34 of the 65 Non-amputated Survivors*

Proved myocardial infarction and also cerebral haemorrhage	No. of Patients
Cerebral haemorrhage	1
Proved myocardial infarction	3
Angina with E.C.G. evidence of ischaemia	11
Angina with normal E.C.G.	6
E.C.G. evidence of ischaemia, but no symptoms	3
	10

and cerebral artery disease, with its attendant risk to life, must always be kept in mind when planning treatment, particularly extensive direct procedures in aorto-iliac obliteration. A patient with uncomplicated intermittent claudication is unlikely to lose his leg, but he has a high risk of coronary or cerebral artery disease.

Selection of Patients for Lumbar Sympathectomy

Consideration of the clinical progress of patients in this and other series, in association with the results of blood-flow measurements after operation already mentioned, allows certain conclusions to be drawn to assist in the selection of patients for operation.

Patients must first be divided into two groups, those with uncomplicated intermittent claudication and those with cutaneous ischaemia. As has already been discussed, intermittent claudication probably is uninfluenced by sympathectomy, so that operation should not be recommended in patients suffering from uncomplicated claudication. Patients with ischaemic skin changes seem benefited most by sympathectomy. While there has been no well-controlled series of cases

reported in which sympathectomy has been compared with non-operative measures in the treatment of early gangrene, the measured effect of operation on cutaneous blood-flow, and the striking clinical improvement which so often follows operation, leave little doubt about its value. If direct surgery is not feasible in these patients—as so commonly it is not, owing to the distribution of the lesions, particularly in femoro-popliteal atherosclerosis—sympathectomy must be considered.

Not all patients with skin lesions are suitable even for sympathectomy, however. The progress of established gangrene in the foot itself will not be influenced by the operation, so that operation is unjustified. In less obviously unsuitable patients the clinical course of the disease so far will give some guide regarding the probable result of operation. Patients who present with a rapidly deteriorating foot, with a very short history, will probably progress to gangrene and amputation in spite of operation. On the other hand, those patients who develop a minimal skin lesion, such as a pressure ulcer or a small area of digital gangrene, in association with long-standing claudication, are likely to respond well. Blood-flow measurements support this view. It is therefore in this latter group that sympathectomy may prove most rewarding.

The prime indication for lumbar sympathectomy by itself in obliterative vascular disease is the early ischaemic foot in a patient who gives a long history of vascular trouble, but who, for one reason or another, is unsuitable for direct arterial surgery.

Summary

The clinical progress of 100 consecutive patients who had undergone sympathectomy one to seven years previously for obliterative vascular disease of the legs has been reviewed.

Only 13% of patients with uncomplicated intermittent claudication showed positive improvement after operation. How far this can be ascribed directly to the operation is discussed.

Over half the sympathectomies carried out in patients with ischaemic skin lesions were followed by healing of the lesion. The importance of good selection of patients in this group is discussed.

The association of peripheral, coronary, and cerebral artery disease was noted in a large proportion of the patients.

The indication for lumbar sympathectomy in obliterative vascular disease is defined.

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