ACTA MEDICA IRANICA
Vol. XX. 1977, P.111—122

Surgical treatment of chronic occlusive in peripheral arteries (Review of 100 cases)

H.AHRARI M.D.

Previously, surgery of the vascular system was limited to entities like arterial injuries, traumatic aneurysm and arteriovenous fistulas. But, ever since the advent vascular substitutes the situation has changed. There is now some hope of solving the problem of reconstructive surgery of the arteries.

By using different techniques, or a combination of methods, we have carried out surgical procedures on one 100 cases, with various vascular lesions in many areas of the vascular bed , and have restored a pulsatile flow to the distal segment.

The aim of this article is to describe the program of treatment and research of the etiological factors in 100 cases of occlusive diseases of the peripheral arteries in this ward, namely , The First Surgical Ward of Pahlavi University Hospital, Tehran.

Associate Professor in Surgery Department of Pahlavi University Haspital Tehran

History: The surgical treatment of peripheral arterial insufficiency to the extremities involves a number of different procedures. These include lumbar sympathectomy, which is of special interest because the first operation of this kind was carried out by the Argentinian doctor, Julio Diaz, in 1924 with the object of improving circulation in peripheral vascular disease.

This was after Leriche in 1913 had shown that Periarterial sympathectomy could give a vasodilation. Interest in lumbar sympatectomy is still fairly great in various parts of the world.

The modern technique for vascular surgery was elaborated at the beginning of this century, in the first instance, by Carrel, who proved experimentally that arterial defects could be succesfully repaired by, inter alia, segments of veins and arterial segments taken from experimental animals of the same type, so that the method would be clinically usable and that the surgeon would have arteries of various calibres lengths available.

Carrell also investigated different methods of preservation for arterial transplantations and was awarded the 1912 Nobel prize in medicine for his studies of vessel sutures and transplantation.

Vein transplants had been clinically used even earlier for arterial reconstruction after extripation of aneurysm. The entirely successful operation of this kind was performed in 1913 by Laxer.

A large number of traumatic aneurysms were radically operated on during the first world war, particularly by German surgeons. The econd orld ar did not bring about any improvement in reconstructive vascular surgery, but during the Korean war arterial reconstructions with auto-

transplanted vein had been carried out on a major scale and with a great number of functioning extremities as the results.

Vein transplantation for correction of segmental chronic occlusions of an arteriosclerotic nature in the arteries of the extremities have been used more and more ever since the method was introduced about the same time in 1949 by Kunnlin and Lerich.

Homologous arterial transplantations came into practical use, primarily due to work done by Gross, Bilt and Peirce who in 9 blue baby cases used homologous arterial transplantations as a Shunt between the aorta and the pulmonary artery, (Ref; 6) and also in 6 cases of coarctation of the aorta, correcting the defect after resection with arterial segments from a vessel bank.

The progress has continued in the direction of the use of vein transplantation instead of synthetic material, primarily because the clinical results have gradually become increasingly worse and late occlusions after operations with synthetic grafts have been very common.

Thromboendarterectomy or endarterectomy by the half open method using special instruments (e.g.a cannon stripper) was carried out in this type of operation. The intima and part of the media with arteriosclerotic changes was isolated from the adventia and the outer layer of the media. In this way the occluded parts of the vessel were removed.

The disadvantage of this half open method for endarterectomy has been the difficulty of performing a sufficiently complete opear ting In certain cases parts of the intima and media have been remained, increasing the risk of secondary thrombosis , and moreover, there would sometimes be the risk of perforations of the arterial wall. In

addition, with a fully open endarterectomy of a longer or shorter segment of an artery, it has been necessary to widen the vessel with the aid of an autologous vein transplantion, as in the method described by Sterling Edwards. (Ref No: II).

In the major work published in 1965 by Szilagyi et al, it was also pointed out that the surgical treatment of arterial occlusions in the fermoro - popliteal region has been carried out during the last 4 years only with an autologous vein bypass . (Ref,4,5) Synthetic protheses have been wholly avoided on account of the very bad outcome. (Ref. 8, 12).

Clinical progression and investigation.

Muscles are the tissue having by far the greatest demand for exygen. (Ref: 2) As the arterial blood supply to the limb decreases, it is the muscles which show the first , and in many cases, the only symptom of arterial insufficiency. Intermittent claudication is usually felt in the muscles of the calf and less often in the foot or anterior compartment of the leg. Iliac or aortic occlusion may result in claudication of the buttock muscles in the Lerich syndrome. It is at this stage that many patients come for medical advice which can only be given after full clinical study. While careful palpation of arterial pulses will aften locate the approximate sit of the block , investigations also include appropriate tests for diabetes mellits and an electrocardiogram. Arteriography shoulb not be performed at this stage since surgery is not immediately contemplated (Ref; 2) and the procedure is uncomfortable and potentially dangerous, with the occasional occurances of arterial thrombosis, dissection or false aneurysme. Possibly in the future ultrasound diagnosis can be used as a replacement for arte-

riographical study.

Positive diagnosis.

Significant occlusive arterial disease may be diagnosed, even before the onset of symptoms, by routine evaluation of pulses. Absense or reduction in the amplitude of pulsation in the femoral, popliteal or posterior tibial artery usually indicates occlusive arterial disease.

The oscillometer is still used by some, although it probably gives less reliable and less consistent information than careful assesment of the pulses by palpation.

Plethymography, skin temperature mesurements and electronic devices for measuring blood flow are not substitutes for a physical examination and are not essential for diagnosing occlusive arterial disease. Furthermore, the results of these procedures can be misleading when they are not interpreted in relation to the findings elicited by the patients. medical history and by physical examination.

Arteriography is not required to establish the diagnosis of arteriosclerosis affecting the circulation to the lower extremities.

However arteriograms do establish the precise location of the arteriosclerotic lesions and the degree of involvement of the total circulatory of the collateral.

pathology:

The most important differential diagnosis is between arteriosclerosis and Buerger's disease: in the acute stage the small arteries are thrombosed by granulomatous centers, polymorphonuclears and giant cells, plus small abscess formation which is characteristic of Buerger's disease. (Ref; 7, 10)

In the chronic stage thrombosis becomes fibrotic and with some recanaliculations. But the question of the muscle

changes is not established among the different authorities and the subject still remains controversial.

Clinical material and method of study

The material which is reviewed in this report covers the period between 1966 - 1975 and includes altogether 100 patients who were operated on for arterial occlusion in the upper and lower extremities. They consisted of 98 men and 2 women.

Age: 40 cases were between 20 to 40 years of age 40%

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42 cases were between 40 to 60 years of age 42%

18 cases were morethan 69 years of age 18%

Duration of symptoms:

38 pateients had symptoms for many months up to one years 38%

40 patients had symptoms up to two years 40%

20 patients had symptoms morethan 2 years 20%

2 patients had symptoms for oniy 3 weeks. Both of them had diabetes as well 2%

Symptoms and complication at the time of diagnosis:

22 patients came with claudication and 5 to 200 meters walking capacity. 34 patients came gangrane.

Extention and location of the disease with arteriographical study:

11 cases had occlusions in the iliac artery, including 2 cases of so called Leriche syndrome. 11%

18 cases had occlusions in the femoral arteries 18%

38 cases had occlusions in the femoro-popliteal arteries 38%

33 cases had occlusion below the popliteal arteries 33%

Associated disease:

In our series 9 cases had diabetes; 8 of them were

amputated and one patient was discharged after medical treatment.

Tobacco-smoking:

Information as to the incidence and extent of tobacco smoking it is of interest that at the onset of the symptoms of arteriosclerosis obliteran 97% were smokers, 33% smoked more than 20 cigarettes a day , and only 3% were non smokers.

Hypertension:

This is at least an accelerating factor in the pathogenesis of atherosclerosis. In this group one patient had blood pressure over 150 mm of mercury and 90 mm in diastol. It is noteworthy that almost all patients with arteriosclerosis obliterant did not have hypertension. It would appear that in patients with arteriosclerosis obliterant hypertension can, not be considered a frequent accelerating factor in the disease's development.

Plasma cholesterol:

The concentration of plasma cholesterol was determined in all patients. In this group we had no patient with high blood cholesterol.

Choice of operation:

The methods used for restoration of circulatory continuity, according to their pathological changes and location in the arterial system and depending the extent of the diseases, include thromboendarterectomy with vein patch graft and vein by-pass sympatectomy and amputation.

In 31 cases thromboendaterectomy was used on the iliac and superficial femoralis arteries, some of these operation using the indirect method with the aid of a cannon disector. In 5 cases endarterectomy with patch graft was performed,

and in 2 cases, because of long occlusion, vein by-pass was the chosen method of operating.

Lumbar and cervical sympathectomy were performed with the aim of increasing the blood flow through the collateral oirculation for Buerger's disease, which abolished rest pain.

In 47 cases sympathectomy was performed and 4 patients and cervical sympatheotomy.

19 cases were amputated because of servere rest pain and extensive gangrene, including 8 diabetic patients.

One patients was discharged after medical treatment.

2 patients refused an operation.

Mortality rate:

One patient died 10 h after the operation because of heart failure.

Post operative evaluation:

The immediate post operative results for the 20 cases in which vascular surgery was performed, the patients left hospital with warm skin of good color, satisfactory walking capacity without claudication, and good palpable pedies arteries pulse. For the 35 sympathectomysed patients, skin color and skin temperature were changed after the operation , with moderate claudication , but their walking distances improved. In some cases these patients used vessel dilatator drugs.

Final Results:

Considering the difficulties in obtaining reliable data, sny evaluation of final results would remain rather doubtful.

Summary and conclusion:

The purpose of this article is to discuse the philosophy of our approch to the severely ischemic extremity and our

current methods of treatment.

1 - The natural history of artheriosclerotic arterial obstruction should always be borne in mind. There is no doubt that many people have some degree of arterial stenosis or obstrcction and never suffer symptoms, either because of the reduced demand due to senility or because they are prepared to tolerate minor inconveniences which do not significantly interfere with their lives or livelihood. It should also be remembered that a proportion of patients with claudication improve spontaneously ever a time scale extending to many months or years. Taylor and Cale (1962), in a long term follow up of patients with untreated intermittent claudication, found spontaneous relief of symptoms in 39 per cent of the cases, no change in 45% and 16% worsening.

Because of this it is impossible to lay down precise rules concerning the treatment of patients with intermittent claudication.

It would be wrong to advise major arterial surgery in an elderly patient with extensive main vessel disease and relatively mild claudication, and equally wrong to deny surgical treatment to an active younger patient with a well localized arterial lesion. It is superfuous to add that, anyhow, the surgery must not make the patient worse.

2- In a survey of a decade of experience, the arterioplastie treatment of occlusive disease seems to fall into three groups based on the anatomic distribution of the lesion. (Ref, 13).

A - These in whom the obstructive disease is limited to the aortoiliac segments of the arterial tree supplying the leg.

B - Those with both aort-iliao and femoral arterial disease.

C - These with only femoropopliteal or proximal part of the popliteal arteries.

Results in both the aorto-iliac and femoral arterial disease operations were in general satisfactory. The good early results of aorto-iliac operations showed only a slight deterioration during follow up, after femoro-popliteal operations the rate of early success rapidly declined.

Aotrto-iliac stenosis is a more promising situation for reconstruction. Either grafting or endarterectomy is available.

We abondon endarterectomy in small arteres below the popliteal arteries to avoid reobstruction due to thrombosis.

We agree that sympathectomy should be performed at the time of trophic changes in the skin of the foot, and for early gangrene, we remove the third and fourth lumbar ganglia. This operation should increase the circulation to the skin below the knee. We do not recommend sympathectomy as the treatment for claudication.

3- Apart from the data derived from our group, patients gave us the following information.

a - many patients come from the northern part of Iran which has a Mediteranean climate.

b - None of them had a hight cholesterol level.

c - Only one patient had high blood pressure.

d - Half of the patients had occlusion below the popliteal arteries (mostely Buerger type in character)and femoro popliteal obstruction which were segmental occlusion or iliac arteries.

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