The Pattern Of Occlusive Arterial Disorders Affecting The Lower Extremities In India

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The occlusive arterial disorders, particularly affecting the lower limbs have been variously diagnosed as Buerger's disease and Atherosclerosis. In the earlier period of the understanding of these disorders, Buerger (1908) gave an account of 50 cases describing the features of Thrombo-angitis obliterans (TAO). His subsequent publication confirmed the view that TAO was the prevalent cause of most of the cases of arterial obstruction. Boyd et al. (1949) were the first to challenge the existence of the Buerger's disease and this was followed by a spate of articles, (Fisher 1957; Wessler et al. 1960 etc.) who progressively described the mistaken diagnosis of TAO in cases who were those of atherosclerosis in actual fact. Around this time the pendulum had swung towards the diagnosis of Atherosclerosis to such an extent that the very existence of the entity of TAO was questioned. (Editorial Brit. J. J. 1960)

During the course of a drug trial in peripheral occlusive arterial diseases, one of us (Joshi 1963) investigated 31 cases. In 14 cases out of these the percutaneous femoral

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arteriography was done. In 9 cases, the block was found to be continuous, without the retrograde filling of the popliteal artery and only 3 cases showed a segmental block, which was generally characteristic of atherosclerosis. These findings together with several other features which were noted, created a sense of doubt about the universal existence of the atherosclerotic etiology in majority of arterial occlusions here. The present study was, therefore, conducted to elucidate the pattern of arterial disease, prevalent in this part of the world.

Material and Methods

Thirty-six consecutive cases of lower limb ischaemia who came to our surgical unit from 1967 to the end of 1970, were included in the present trial. In all cases the clinical findings were carefully noted. Percutaneous femoral arteriography was performed in each case.

All cases in the present series were males. The clinical features of these cases were correlated to the type and nature of the arterial obstruction. The arteriographic study revealed that there were two distinct patterns of arterial blocks. The first one showed a continuous block starting from various points along the course of the main artery of the lower limb. The distal limit of the block in these cases could not be made out on the arteriograms. Thirty-one cases out of 36 belonged to this pattern and they have been considered together. Five cases who showed segmental block were studied as a separate group.

The clinical features of the 31 cases from first group were as follows.

As it will be noticed from the table, 15 cases presented with ulceration and/or frank gangrene of the toes. The incidence of gangrene was higher in patients having the upper limit of the block, below the inguinal ligament. Out of 5 cases, who had a block above the inguinal ligament, only one patient presented with gangrene.

Eighteen cases out of these 31 gave long history of smoking, 13 of whom presented with gangrene. There were only two cases of gangrene in this group who did not give any history of smoking.

The age incidence of this group showed an interesting relationship to the level of the block. The average age tended to be progressively higher with the higher level of the block.

The arteriographic studies of these 31 cases of continuous block showed that 2 case had blocks starting at the origin of the common iliac artery, 3 cases had a block starting at the origin of the external iliac artery and 9 cases showed the block in the superficial femoral artery either just below the origin of profunda femoris or anywhere

in the middle of the thigh. Ten cases had a block below the adductor hiatus in the popliteal artery, some showing the block at the level of the adductor hiatus itself and some midway in the course of the popliteal artery. It could be uniformly seen in these cases that there was no traceable lower limit of the block in the main artery itself and the continuity of the flow of blood in the patent upper part of the vessel was maintained by some branch arising just above the upper limit of the block.

Only 5 cases out of 36 showed a segmental block. Two of them had a segmental block in the common iliac artery, one had a segmental block from the origin of the external iliac up to the origin of the profunda femoris artery and two cases had a segmental block in the superficial femoral artery from below the origin of profunda femoris artery up to the adductor hiatus. Two of the 5 cases of segmental block showed gangrene of the toes, both of whom were smokers.

Cases of this group could be treated with direct arterial surgery by Saphenous vein by pass procedure.

One case represented above had shown the arteriographic appearance of a continuous block. On exploration, however, the popliteal artery was found to be partially patent. A saphenous by pass procedure was done on him. This was one of our early cases who was given anticoagulants in the immediate post operative period. This gave rise to severe bleeding from the graft and hence the graft had to be removed. We did not give anticoagulant therapy to any of our subsequent cases.

Operative findings and results:

Twenty-three cases from the present series were operated upon. Direct surgery on arteries was undertaken in 14 cases, 11 belonging to the first group of continuous block and 3 belonging to the second group of segmental block.

In 5 cases out of 11 from the first group, no form of direct surgical procedure to overcome the obstruction was possible. The arteriographic findings of the continuous block right down up to the popliteal bifurcation was confirmed at the operation. The thrombosed portion of the vessel was small and showed considerable periarterial fibrosis and adhesions to adjacent structures. On opening the vessel, the thrombus inside did not show a good plane of cleavage and was found to be densely adhered to the vessel wall. There was thus no possibility of doing either thromboendarterectomy or any bypass procedure. At this stage, a small segment of artery was removed for histopathological examination. In these cases, only sympathectomy was done.

In the remaining 6 cases, thrombo-endarterectomy was undertaken. This procedure was satisfactorily possible in 3 cases. In one of them it was combined with a venous patch and this gave good result by achieving re-enforcement of the blood flow of the profunda femoris artery. In the other 3, thrombo-endarterectomy was performed but the plane of cleavage was again not satisfactory. These cases thrombosed again and operative results could be judged as being poor.

In 3 cases from the second group of segmental block, saphenous vein by pass procedure was undertaken, the result was good in two cases and was poor in the third, whose graft bled because of immediate post operative anticoagulant therapy as mentioned earlier.

In subsequent 9 cases from the first group showing changes of gangrene of the toes, the procedure of sympathectomy alone was undertaken.

The histopathological examination of the arterial segments removed from 11 cases showed the changes of old inflammatory pathology in the form of round celled infiltration and fibrosis, in and around the vessel wall. The internal elastic lamina was intact and the adherent thrombus could be seen within the lumen of the vessel in the process of recanalisation.

Discussion:

In the course of the present study, an attempt had been made to take into account the important features of these disorders viz. the age of the patient, his smoking habit, the presence of ulceration or gangrene and to correlate them to the level and nature of the vascular block as revealed by arteriographic studies. The arteriographic pattern is further correlated to the operative findings in 14 cases and histopathological examination in 11 of them.

All the 36 cases in the present study have been males. The majority of patients, i.e. 27 out of 36, were below 45 years of age. There was an interesting correlation between the age of the patient and the level of the arterial block. The average age was progressively higher with the higher level of the block. Only in 3 cases below the age of 35 years, the block was above the femoral bifurcation. The average age of the patient with segmental block was higher than those having continuous block. The findings of progressively higher age with the higher level of the block, in 31 cases from the first group of continuous block which formed the majority, indicate that the pathology therein is centripetal in its course—a point so characteristic of TAO.

As regards the history of smoking, it may be mentioned that the incidence of smoking is probably higher than what has been recorded. Though the history of smoking in the immediate past was not elicited in some of them, they have had periods of heavy smoking in the earlier age. Out of 36 cases, 20 gave history of smoking. The habit of smoking, however, had an important bearing on the incidence of ulceration or gangrene. It was found that the incidence of ulceration or gangrene was present in 17 cases, 15 cases belonging to the group of continuous block and 2 from the group of segmental block.

It is interesting to note that 18 out of 31 patients from the group of continuous block were smokers and ulceration or gangrene developed in 15 of them. Both the patients of segmental block showing gangrene were heavy smokers. At any level of the block the habit of smoking seemed to determine the development of gangrene. It was also found that the incidence of gangrene was higher in the blocks affecting the vessel below the adductor hiatus.

The operative findings in all cases showing the continuous block showed the evidence of periarterial inflammation in the form of dense perivascular adhesions and attempts at restoring the blood flow by thrombo-endarterectomy, were unsuccessful because of the continuous nature of the block even beyond the popliteal bifurcation and the poor plane of cleavage between the thrombus and the vessel wall. This lack of plane resulted in tearing up of the vessel wall itself in few cases and the strippers were ineffective in getting a clean thrombo-endarterectomy. The histopathological studies in 11 of these cases, universally showed the changes of old and recent inflammatory arterial disease. This was similarly found by Reddy and Singh (1969) from Kurnool in 16 out of 30 cases examined by them.

All these points further indicate that this disease, spreading centripetally and found predominantly in male smokers is inflammatory, rather than degenerative in origin and its extent is determined by the susceptibility to and duration of extrinsic factors like smoking.

The incidence of the inflammatory arterial disease as compared to Atherosclerosis has similarly been recorded to be high by several other workers from this country. Twenty-one cases out of 23 treated by Jejurika et al. (1963) from Aurangabad were found to have TAO, 24 cases treated by Balkrishna Reddy (1964) from Hyderabad were all males and were all heavy smokers, 16 of his cases were below 40 years and 21 of them had gangrenous changes and all his cases were diagnosed as being due to inflammatory arterial disease. In 12 cases treated by Singhai (1965) from Bhopal again were all males, heavy smokers, belonging to the age group 21 to 42 and 10 out of these presented with gangrenous changes. Razdan et al. (1957) have recorded 125 cases of TAO giving practically the same

clinical features as regards the male preponderance, habit of heavy smoking and its prevalence in the low socio-economic group.

There is no doubt that the peripheral vascular disease here, as compared to the western countries, is predominantly inflammatory in origin. Basu (1966) in an editorial in the Indian Journal of Surgery has similarly observed that the commonest form of vascular disease is TAO, which is found only in males, affecting the inferior extremity in 95% of cases, is associated with smoking and is met with in poor sections of the society. The course of the disease is protracted and is punctuated with periodic exacerbations. On the other hand the incidence of atherosclerosis in general rural population in India is comparatively low (Gour 1964). While studying atherosclerotic aortic lesions in 500 autopsies, Mathur and Kumar (1962) found that atherosclerotic indices above the age of 30 years were considerably lower than reported from U.S.A., Jamaica and Japan. It is thus obvious that the atherosclerotic changes are not found to the same extent as found in more affluent western countries.

The singular outstanding feature of the cases of TAO in this country is the considerable rarity of associated superficial thrombophlebitis (Joshi 1963, Jejurikar 1963, Balkrishna Reddy 1964, Basu 1966, Reddy & Singh 1969). This does not negativate the diagnosis of inflammatory nature of disease, as considered by Krandjian R. et al. (1971) from their study of Ceylonese patients.

The presence of inflammatory arterial disease is progressively being recognised by the western authors, (Eadie et al. 1968, Brown et al. 1969 and Eastcott 1970) as a distinct clinical and pathological entity. This condition is not only having distinct histopathological features (Brown et al. 1969) but also certain haematological differences in the form of significantly higher concentration of heparin precipitable factors of fibrinogen (HPF) (John L. et al. 1967). The evidence of the inflammatory nature of the arterial diseases is substantiated by further observation in the present series that the blocks in the majority are progressively centripetal in course, they are continuous rather than segmental and the thrombi in the vessels are very densely adherent to the wall making thrombo-endarterectomy much less rewarding than reported by western authors. The bypass procedure on the other hand, when feasible has given more satisfactory results (Basu 1966).

The principal difficulty experienced by almost all the workers has been in clearly defining the cases of TAO from those of Atherosclerosis. A classical example in the present series has been of a patient M.S. aged 60 years, giving a long history of smoking and presenting with gangrene; arteriography showing a continuous block starting at the origin

of the superficial femoral artery and extending downwards. Such cases show features both of atherosclerosis and inflammation and create difficulties in classifying them clearly into any one of the distinct groups. These cases have been classified as belonging to an intermediate group by Eadie et al. (1968).

We have similarly come across several such cases in the present series. The cases of blocks above the inguinal ligament are more often atherosclerotic in origin than inflammatory. But even in some of these cases, some of the features of inflammatory element in form of gangrene etc. have been observed. Incidence of these cases belonging to the intermediate group can be easily explained as follows.

Atherosclerosis is an inevitable natural process of aging affecting every individual. The extent of atherosclerotic changes varies in different individuals and is reported differently in different countries. The process of atherosclerosis is relatively slow and development of collaterals is generally adequate and gangrene is infrequent. The process of thrombo-angiitis obliterans on the other hand, is initiated by external agencies like smoking, infection, nutritional deficiencies, etc. The habit of smoking, which is uniformly accepted as being the most important factor in the etiology of this disease, may vary in respect of the age of starting the habit, the number of the cigarettes or bidis smoked per day, the duration of the smoking and the susceptibility of an individual to develop vascular changes. These factors would govern the rate, at which the vessels would get obliterated, influencing the formation of collateral circulation: faster the process poorer the formation of collaterals with resultant impairment of blood supply and gangrene.

Once the vessel wall is obliterated it remains so permanently and the inflammatory signs are replaced by fibrosis, adhesions etc. The advancing age in these cases would bring on the changes of atherosclerosis and eventually the patient would show a mixed picture of atherosclerosis and TAO. Conversely, a patient who is a subject of juvenile atherosclerosis with proximal blocks may take to smoking and superimpose effects of inflammatory disease at a later stage again showing a mixed picture of both these disorders.

The proportion of such cases showing features of both the disorders is very high. In the present series 3 cases unequivocally belonged to the group of atherosclerosis, 18 cases showed a mixed picture of TAO and atherosclerosis while 14 cases showed an unmistakable picture of Thrombo-angiitis obliterans. Similarly Eadie et al. (1968) reported 5 cases out of 19 belonging to the intermediate group. Ten cases out of 19 showing thrombosis and recanalisation reported by Krandjian et al. (1971) similarly appear to show up a mixed clinical picture of Atherosclerosis and Thrombo-angiitis obliterans.

In respect of peripheral vascular disorders, therefore, one is confronted with two superimposing etiological factors. One which is natural, inevitable and related to the aging process and the other which is acquired and related to the pattern of smoking habit. Both these factors are further controlled by the individual susceptibility for atherosclerosis as well as degree of sensitivity to external agencies like smoking and the end result of a peripheral vascular disease in an individual case is a sum total of these factors both inherent and acquired. These features can well explain the final picture of the disease in a given individual.

Summary:

Thirty-six patients who came with peripheral-arterial disease were studied clinically and arteriography was done in all of them.

Thirty-one cases showed continuous block starting at various points along the course of the main artery of the lower limb indicating the diffuse nature of the disease. Five cases showed segmental block.

The operative findings in 19 cases and histopathological studies in 11 of them together with clinical and angiographic evidence prove that Thrombo-angiitis obliterans is by far the commonest form of arterial disease in this country.

A considerable proportion of cases show a mixed picture of both athero-sclerotic and inflammatory arterial disease. An attempt has been made to explain the incidence of such cases.

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