A recurrence of congenital hæmolytic icterus following splenectomy may be caused by splenosis.

I wish to acknowledge the splendid assistance given me by our pathologist, Dr. J. B. McKay, in the laboratory tests necessary to diagnose the several phases of this case.

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NEW FACTORS IN THE ETIOLOGY OF OBLITERATIVE ARTERIAL DISEASE*

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THIS brief report has been prepared in an attempt to shed some further light on the etiology of obliterative arterial lesions of the legs. The subject material is taken from 25 cases recently studied in the Vascular Service of the Royal Victoria Hospital and certain conclusions are drawn from the clinical and laboratory investigations, and also from the fact that in every case a specimen of artery for pathological examination was obtained from one of the leg arteries.

The diagnosis of obliterative arterial disease of the lower limb is not too difficult to make providing one keeps the condition in mind and spends a few minutes in the examination of the feet and legs. A true history of intermittent claudication or ischæmic neuritis, and the absence of pulsations in the dorsalis pedis, posterior tibial and popliteal arteries are easily determined. The presence of ischæmic changes in the foot with blanching on elevation and rubor on dependency will corroborate the findings. However, the determination of the type of obliterative disease is a much more difficult matter.

In following the present day literature on this subject there appear to be only two causes of chronic ischæmia of the extremities. These are Buerger's disease and arteriosclerosis. The differential diagnosis between Buerger's and an early case of arteriosclerosis has been most difficult to make but, in brief, it appears that in the past the diagnosis of Buerger's disease was mainly made by excluding any evidence of arteriosclerosis in the patient. This diagnosis was aided by such additional evidence as the youth of the patient, his being of the Jewish race, with a history of heavy smoking, and perhaps of a migrating phlebitis. Using such criteria therefore, the majority of cases of obliterative vascular disease up to the age of fifty were diagnosed as Buerger's. Such was the situation preoperatively in 19 of our 25 cases.

It is the purpose of this paper to present some evidence that the picture is not quite so simple as this; that Buerger's disease is relatively rare; and to describe a group comprising the majority of our cases, showing a picture which is neither Buerger's disease nor arteriosclerosis as we now define it.

METHODS AND RESULTS

In the cases studied, an investigative routine was carried out and consisted of a hæmogram, electrocardiogram and cardiac examination, blood Wassermann, x-ray of the arteries of the pelvis for calcification, examination of the fundi for evidence of arteriosclerosis, oscillometric readings of the leg arteries and skin temperature readings before and after lumbar sympathetic procaine block. More recently we have used the new drug tetra ethyl ammonium chloride to check the results of the sympathetic block. This drug causes a paralysis of the autonomic nervous system at the ganglionic synapses for varying periods of time depending on whether it is given intravenously or intramuscularly. The results in skin temperature readings have closely paralleled those following lumbar sympathetic block.

All cases had pathological examination of a leg artery taken either from an amputation specimen or from biopsy of the dorsalis pedis artery at the time of sympathectomy.

Six of the 25 cases showed evidence of arteriosclerosis in the fundi or on x-ray of the

* From the Surgical Service of the Royal Victoria Hospital and McGill University. Presented before the Royal College of Surgeons of Canada in Ottawa, November 16, 1946.

pelvic arteries and usually there were suggestive findings also in the cardiogram. No diabetic is included. All of these six showed rises of skin temperature over two degrees C. in the foot following lumbar sympathetic procaine block and were consequently treated by lumbar sympathectomy. These findings indicate, contrary to previous belief, that the majority of early arteriosclerotics are capable of considerable vasodilatation of their collateral system.

In the remaining 19 cases a tentative diagnosis of Buerger's disease, active or quiescent, was indicated according to the existing criteria. However, on pathological examination only four were proved to be Buerger's, these all requiring amputation, and being the only amputations in this series (Figs. 1 and 2).

affected side, simulating an aneurysm, and the plaques were demonstrated by palpation at the time of sympathectomy.

This leaves 11 cases with no clinical or laboratory evidence of arteriosclerosis, who on examination of a biopsy section of the dorsalis pedis artery showed no evidence of Buerger's disease. I would like to discuss this group in some detail as I believe their significance has hitherto not been appreciated.

These were all males in the middle and older age groups, the youngest being 43 and the oldest 62. Their complaints were chiefly intermittent claudication, which had been present and gradually increasing over a period of one to two years. All were moderate to heavy smokers. Examination revealed one leg involved in 5 and bilateral involvement in 6.

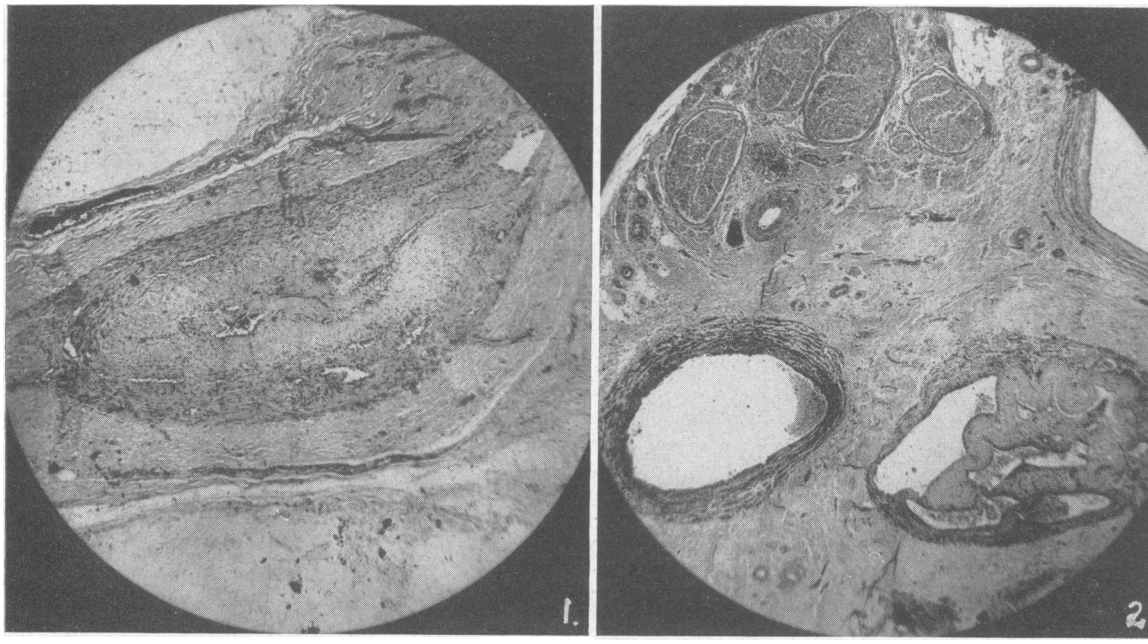

Fig. 1.—Section of dorsalis pedis artery in a case of Buerger's disease showing the well organized thrombus blocking the lumen, one area of recanalization, and the round cell infiltration of the arterial wall and surrounding tissue. **Fig. 2.**—Low power view of a case of Buerger's disease showing the typical changes involving not only the artery but, as is usual, the entire neurovascular bundle.

Four cases were found to be due to miscellaneous causes, one being a young man with intermittent claudication subsequent to a bland thrombosis of the arterial system of one leg from the mid-femoral downwards following a fracture of the ankle. The second was a similar case, but subsequent to an acute attack of scarlet fever. Their pathological picture was almost identical. The other two showed arterial ischæmia in one leg subsequent to narrowing of the common iliac artery from an undetected atheromatous plaque. Both had loud systolic bruits heard over the common femoral on the

The ischæmic changes in the foot were minimal, but pulsations in the dorsalis pedis, posterior tibial and popliteal arteries were absent and, in one case, in the femoral. Oscillometric readings were greatly diminished in the involved extremities. The special investigations above mentioned were otherwise negative. Intradermal nicotine sensitivity tests were inconclusive. All showed a moderate to good response in the improvement of skin temperature readings following lumbar sympathetic procaine block and consequently all were treated by lumbar sympathectomy with a co-

incident biopsy of the dorsalis pedis artery. Examples are shown in Figs. 3 and 4.

The comparison of these pathological specimens with those shown in Figs. 1 and 2 definitely rules out a diagnosis of Buerger's. The same can be said for arteriosclerosis of the usual medial or intimal type. There is no inflammatory or thrombotic process, and all one can say is that some evidence of chronic degenerative change is present.

It is probable that this picture is not a separate disease entity but one of the earliest changes in the development of an arteriosclerosis. It is difficult to be certain why, with such early changes, arterial obliteration and ischæmia should result when in others with fully developed arteriosclerosis no such condition occurs. One possibility may be that this picture in the dorsalis pedis artery may be due to a blockage by an unrecognized thrombosis higher in the vessel. Examination of the uterine arteries shortly after childbirth, where the flow in these arteries has been suddenly reduced after delivery of the child, will show much the same pathological picture.

It is our belief at present, but based on very little evidence, except that this group is placed toward the latter part of life, that these 11 cases showing the chronic degenerative changes on biopsy are due to local areas of thrombosis in a main limb artery probably on the basis of an undetected atheroma.

SUMMARY

As a result of this study, we have come to the belief that Buerger's disease is much less common than is generally believed, that it is a generalized progressive disease responding only briefly to the present methods of treatment, including sympathectomy, and that leg amputation is a very frequent sequel. On the other hand we believe that the group showing the chronic degenerative process on biopsy has a much better prognosis due to the slowness of the progression of the disease. They also show long lasting improvement following lumbar sympathectomy.

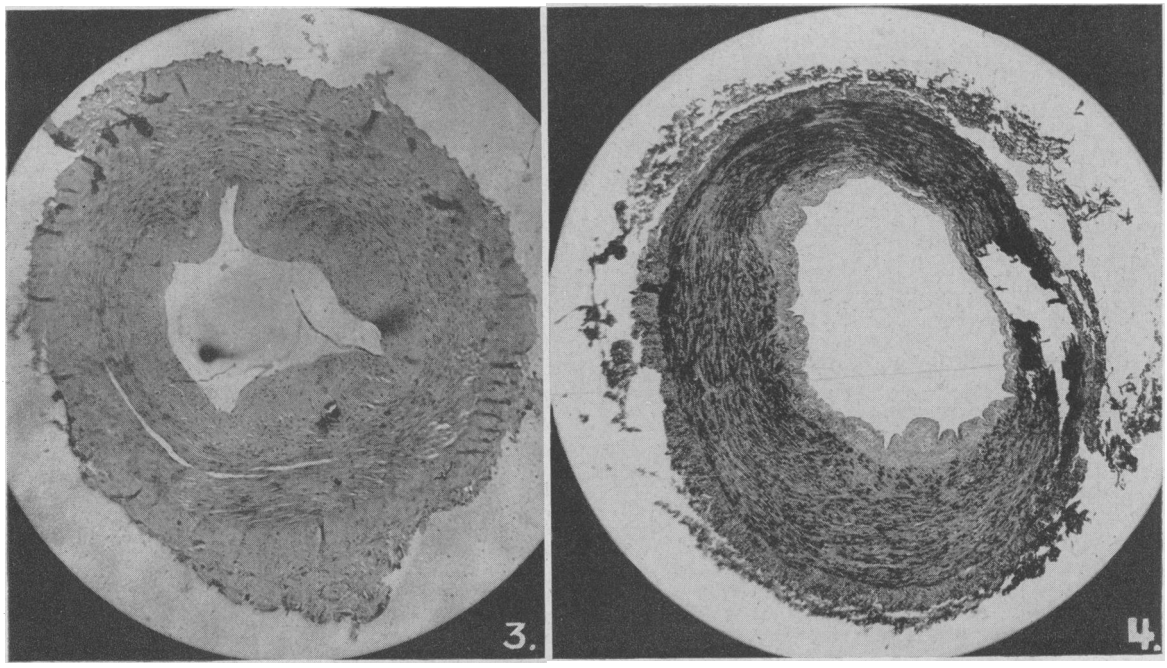

Fig. 3.—Section of dorsalis pedis artery showing evidence of chronic degenerative changes consisting of a markedly thickened intima, fibrous replacement in the medial coat but no evidence of inflammatory or thrombotic changes. **Fig. 4.**—Tri-chrome stain of a similar case indicating the degree of fibrous tissue replacement of the muscular medial coat. No evidence of calcification or atheromatous changes.

It is our opinion that the many glowing reports previously published of the good results of sympathectomy and other treatments in Buerger's disease are incorrect, inasmuch as what is being reported as Buerger's is not necessarily proved.

And finally we feel that a correct etiological diagnosis of arterial occlusive disease of the legs is most difficult, especially in the young and middle-aged group, but that biopsy of one of the main arteries, preferably at the time of sympathectomy, will give the most information possible.