

High Aortoiliac Occlusion

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Introduction

Occlusion of the abdominal aorta at its bifurcation due to atherosclerosis and thrombosis is called Leriche syndrome because of clinical symptoms peculiar to it. This disease is relatively rare in this country, although numerous cases have been reported in the Western world. The occlusion initially is within the confines of the aortic bifurcation and then progresses slowly in a proximal direction, rarely up to the region of the renal vessels, leading eventually to serious renal insufficiency called high aortic occlusion or high Leriche syndrome.

The paper describes 4 cases of high aortoiliac occlusion.

Patients

Case 1 : a 50-year-old man.

In October 1974, the patient was admitted for myocardial infarction.

One month later, he became aware of coldness and pain in his lower extremities. Pulsation of the femoral and popliteal arteries was not palpable bilaterally.

Aortography revealed occlusion of the abdominal aorta just below the renal arteries. Fig. 1.

On April 21, 1975 he underwent axillary-femoral bypass using 8 mm knitted Dacron prosthesis. His postoperative course was uneventful. But in August 1978, he developed sudden onset of abdominal pain and died 3 days later.

Postmortem examination revealed total occlusion of mesenteric artery with thrombosis. Fig. 2.

Case 2 : a 48-year-old man

Toward January of 1971 the patient became aware of coldness of his right foot and began to have pain in the calf muscles during walking. As examination revealed occlusion of the right iliac artery, thrombo-endarterectomy was performed in March 1971. The

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pathological diagnosis was thrombotic occlusion associated with arteriosclerosis and degeneration.

In December 1974 the patient developed a massive bleeding from duodenal ulcer. The resultant blood pressure lowering led to a state of shock, for the treatment of which blood transfusion, parenteral fluids and hemostatic medication were given. One week later, pulsation of the femoral artery was found to

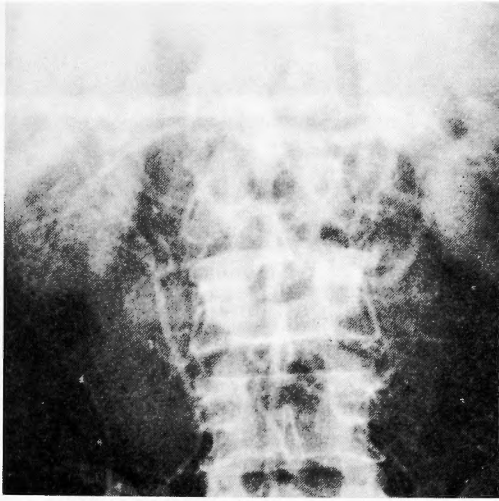


Fig 1 Aortography in Case 1 indicating infrarenal aortic occlusion

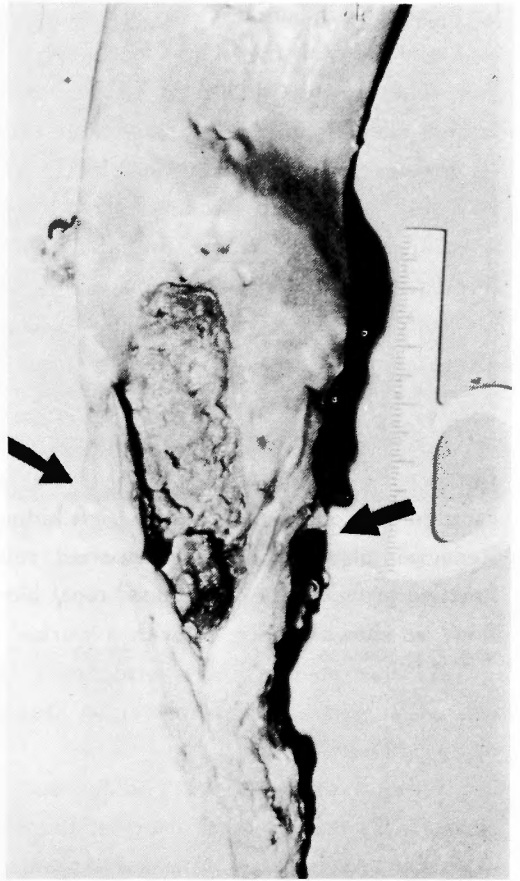


Fig 2 Case 1 Postmortem examination revealed total occlusion of renal arteries (arrows) and mesenteric artery

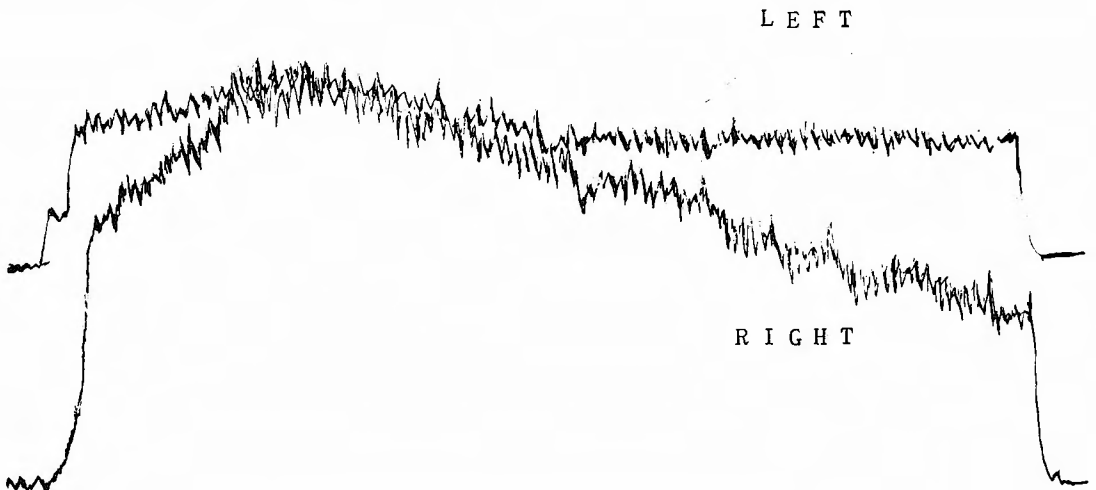


Fig 3 Renogram showing marked lowering of peak value in left

be impalpable bilaterally. Aortography revealed occlusion of the abdominal aorta. At that time he was liable to develop intermittent claudication in both legs after about 10 minutes' walk. His condition then improved progressively to become able to walk virtually without difficulty. In January 1975 he was noticed of his hypertension. Various hypotensor drugs were used but his blood pressure values were persistently found at 200-250/120-160mmHg.

The renin activity in blood was not elevated. Intravenous pyelography revealed delayed excretion of contrast agent in the left kidney. Renogram also demonstrated impaired renal function probably due to reduced renal blood flow, as shown in Fig. 3, with a marked lowering of peak value seen in the left kidney.

As illustrated in Fig. 4, aortography disclosed occlusion of the abdominal aorta that had already progressed up to the region of the renal arteries, with a filling defect at the origin of the left renal artery.

These findings led to a diagnosis of renal vascular hypertension due to thrombotic occlusion of the left renal artery at its origin.

Operative findings : The kidney appeared lustrous and free from abnormalities though rather small in size. A cord-like mass was palpable at the origin of the renal artery, but the thrill was no longer palpable. The unusually well-developed splenic artery was exposed and severed near the splenic hilus in order to be anastomosed with the renal artery. The

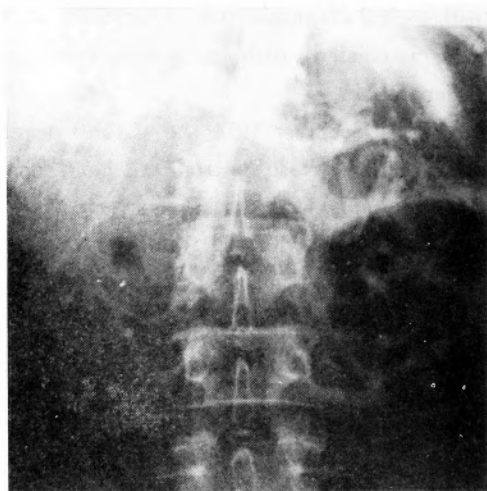


Fig 4 Aortography disclosed occlusion up to the renal arteries

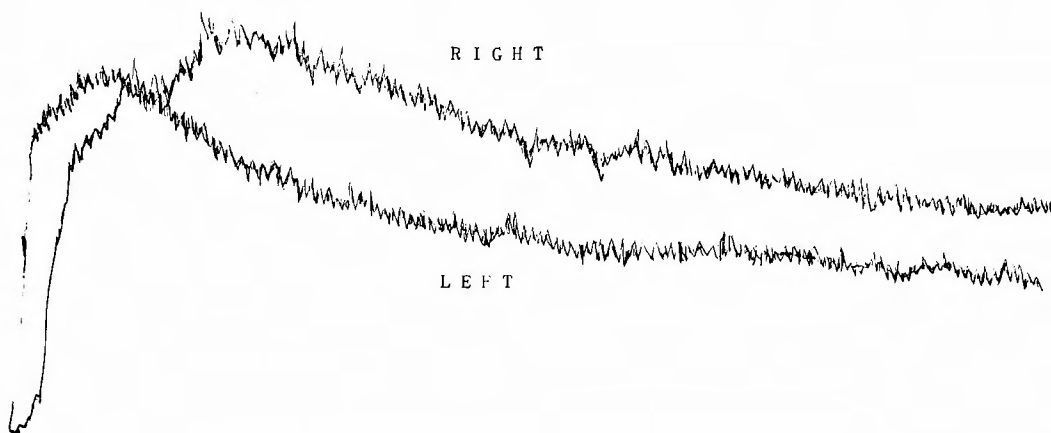


Fig 5 Renogram demonstrated decreased right renal function

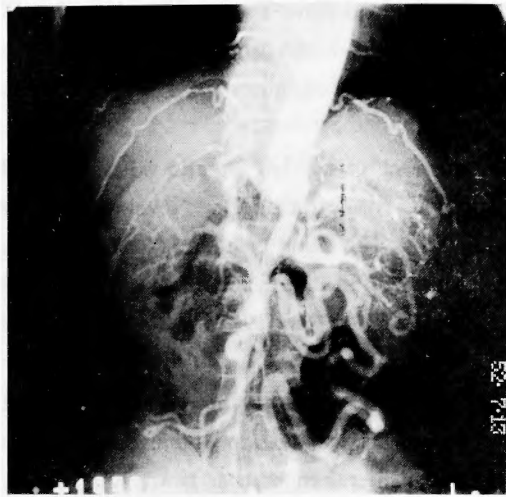


Fig 6 Aortogram showing progression in a proximal direction

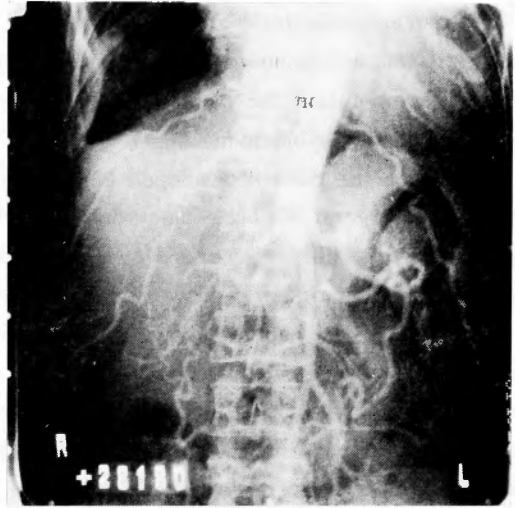


Fig 7 Aortogram showing occlusion at its sup-rarenal level

proximal segment of the splenic artery was passed behind the pancreas and connected to the renal artery by an end-to-side anastomosis.

In several hours after operation the blood pressure began to show a declining tendency ; it returned to the normal range in one week and was then kept almost stationary at 110-120/70-80mmHg. Subjective symptoms, such as headache and general malaise, were gone. The course during subsequent 10 months was quite uneventful. Fig.5.

But the recurrent hypertension due to stenosis of another side renal artery (right) occurred.

In March 1977 his blood pressure values were persistently found at 240/120mmHg. Renogram demonstrated impaired right renal function, as shown in Fig.6. Aortogram showed the progression of the thrombosis in a proximal direction Fig.7.

Operative findings : The inferior vena cava exposed and the renal vein was then mobilized, exposing the underlying artery.

Reperfusion of the kidney from the aorta appeared inadvisable because of adhesion (difficult to mobilize) and aortic atheromatous degeneration.

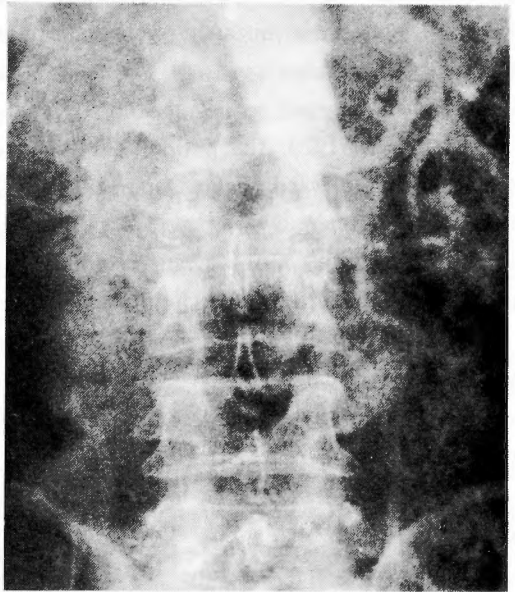


Fig 8 Aortography in Case 4

Superior mesenteric artery was used as a source of blood flow. The umbilical cord vein allograft was anastomosed between superior mesenteric artery and right renal artery.

After operation the blood pressure returned to the normal range.

Case 3 : a 50-year-old man

In 1965 the patient developed a circulatory impairment of his left leg and was diagnosed to have Buerger's disease. He underwent amputation of his left thigh in November of the same year because of necrosis of the left lower leg. Later in 1969 circulatory disturbances occurred in his right leg also, necessitating him to undergo amputation of the right lower leg. Moreover, he had to receive amputation of the right thigh in 1973 due to further progression of circulatory disturbances.

On December 25, 1975 the patient suddenly developed pain in his right flank with associated oliguria and then anuria. Under the diagnosis of renal failure and uremia he was begun on peritoneal perfusion. Fig. 8 shows an angiogram taken at that time. As can be seen, there was occlusion of the abdominal aorta at its suprarenal level with complete failure of visualization of renal arteries. Collateral circulation connecting between extrarenal and renal arteries was poorly developed, with only a few communicating channels being seen in the right kidney. Currently the patient is receiving hemodialysis and under this therapeutic regimen his urine volume is maintained at 600-800 cc per day although hypos-thenuria still persists.

Case 4 : a 70-year-old man

In August 1973, the patient developed a circulatory impairment of both legs. He was admitted to the ward of the Department of Surgery for the treatment of intermittent claudication.

His general condition and status of nourishment were just normal and his blood pressure was 140/80 mmHg with no left-to-right difference.

Systolic murmurs of degree II/V were audible over the upper quadrant. Renal function was within normal range on PSP test.

As illustrated in Fig. 9, aortography disclosed occlusion of the abdominal aorta up to the region of the renal arteries.

On May 10, 1974, he underwent axillofemoral, femoro-popliteal bypass using Dacron prosthesis.

Four years later, in June 1978, he developed oliguria and anuria. Without hemodialysis he died from renal failure.

Discussion

Since Rene Leriche, in 1923, first reported a syndrome of atherosclerotic occlusion of the distal abdominal aorta, the syndrome has been termed a Leriche syndrom⁶⁾.

The aorta is liable to undergo atherosclerotic changes. This particular syndrome is frequently associated with a marked degree of localized atherosclerotic changes in the abdominal aorta, although there may be generalized arteriosclerosis in some instances.

These changes in aortic walls, with resultant disorderly blood flow through the aortic bifurcation, give rise to the formation of thrombi, which in association with accompanying aortitis lead to occlusion of the aorta²⁾.

Because of characteristic symptoms the diagnosis can be made with ease. However, the syndrome should be differentiated from those diseases which produce circulatory disturbances of lower extremities. Insufficiency of erection is characteristic of the syndrome, while low back pain and lumbar weakness are a complaint in occasional patients. The clinical symptomatology may vary widely depending upon the location and extent of occlusive lesion and also the degree of development of collateral circulation.

Among objective signs, pulsation of leg arteries allegedly is impalpable in most instances. However, where collateral circulation is well developed, weak pulses may be palpable. An aortogram proves of great help in the differential diagnosis and at the same time provides reliable information regarding the degree and extent of occlusion of the aorta, according to which to decide whatever therapeutic policy to be taken.

In incipient stage of Leriche syndrome the occlusive lesion is well within the confines of the aortic bifurcation. In later stages there occurs gradual progression in a proximal direction. The syndrome is said to follow a slowly progressive course on most occasions. In case 2, blood transfusion and hemostatic medication were given to overcome hemorrhagic shock caused by a massive bleeding from duodenal ulcer. It would seem that such treatment resulted in alterations of the clotting system, which in turn prompted the progression of preexisting aortic lesions.

When the region of renal arteries is involved in occlusive lesion of the abdominal aorta, the resulting condition is called high aortoiliac occlusion or high Leriche syndrome. In such an instance, there occurs an impairment of renal function due to reduced renal blood flow and the resultant increase in renin secretion gives rise to renal vascular hypertension, which eventuates in death of the patient from renal failure and uremia.

The effective and widely used screening procedures are rapid sequence intravenous pyelography, divided renal function studies, renogram and renal vein renin assays.

The renal vein renin assay is essential in determining the functional significance of a renal artery stenosis. A ratio of 1.5 to 1, stenotic side to contralateral side, is functionally meaningful. The study is only as accurate as patient preparation is careful. All antihypertensive medications should be discontinued for two weeks before the procedure. The patient should be given a diet of 1 gm of sodium a day. Finally, the renal vein renin collections should be obtained with the patient in the upright position. Despite these precautions, renal vein renin assays have a 20% incidence of false negative results for several common reasons. Most are a result of inadequate patient preparation or admixture of blood from the inferior vena cava and renal veins during collection. Equivocal results may also be obtained when rich collateral circulation to the affected kidney develops.

Concerning the progression of aortic occlusion in a proximal direction, Case 2 was found to have a narrowing of the left renal artery at its origin serious enough to cause renal

Table 1

Patient No.	Age	Sex	Alive/Dead	from onset of circulatory disturbance to renal failure (Years)
1	50	M	D	4
2	48	M	A	3
3	50	M	A	10
4	70	M	D	5

vascular hypertension. A dramatic fall of blood pressure resulted from reconstructive vascular surgery and the patient thus proved to be a good candidate for this operation. However, at that time renographic findings demonstrated hypofunction of the right kidney and were interpreted as suggesting the possibility that the circulatory disturbance might be worsened in the future. One year later, the second operation was performed at the another side of renal artery. According to reports from Western countries, there was an unexpectedly large number of cases of Leriche syndrome in which progression of aortic occlusion reached a level just below the origin of the renal vessels, while the renal arteries were actually involved in no more than 3% of such cases⁴⁾ the level and extent of progressions in a proximal directions thus become a prime consideration in the evaluation of prognosis as well in the selection of operative procedure. Table 1 shows the time from onset of circulatory disturbance to renal failure. Atherosclerosis affects the left main stem renal artery more commonly than the right⁵⁾. The relative ease with which the left renal artery is involved in the progression of occlusive lesions might be accounted for at least partly by the anatomical dissimilarity between the left and right renal arteries in their origin.

Since impaired renal function associated with the syndrome under investigation is secondary to circulatory disturbances of the renal arteries accompanying aortic occlusion, a narrowing of the renal vessels is usually localized at their orifice in incipient stage of the disease and, accordingly, recovery of renal function can easily be accomplished by reconstructive vascular surgery. However, once occlusion of the renal artery becomes complete and blood flow to the kidney is blocked, the subsequent progression becomes too rapid and precipitous to afford the time for the formation of collateral circulation and atrophy of the kidney ensures quickly. Any attempt to reconstruct damaged blood flow and thereby to restore renal function will then prove unsuccessful. It should be noted that in Leriche syndrome there is a lack of abundant extrarenal collateral circulation as seen in cases of occlusion of the renal artery due to atherosclerotic changes. This will be readily understandable when one comes to think of the facts that in Leriche syndrome thrombosis and vasculitis also play a significant etiologic role and that the possibility of the formation of collateral circulation is seriously obstructed by thrombotic occlusion of the abdominal aorta which progresses from the distal to proximal portion of the aorta.

In the treatment of high aortoiliac occlusion, similarly as in the case of its low counter-

part, thrombo-endarterectomy and arterial prosthesis, replacing or bypassing the narrowed segment, are feasible. However, in view of technical difficulty stemming from the presence of lesions in the aortic wall itself and also because of the frequent concurrence of hypertension and coronary as well as renal and cerebral arteriosclerosis including the patient's general health and age with Leriche syndrome, utmost care should be taken in performing operative treatment.

BERGAN et al.¹¹ published an operative procedure in which, upon blockade by clamping of the abdominal aorta proximal to the origin of the renal arteries and of the same arteries themselves, the aorta is transected at a level distal to the origin of the renal arteries, subsequently thrombo-endarterectomy is performed through the distal cut end of the aorta and immediately thereafter the arterial clamp is released and reapplied to the aorta at a level distal to the origin of the renal vessels (consequently the renal blood flow is resumed) and then a Y-shaped arterial graft is transplanted. This procedure is good for occlusion of the abdominal aorta which has progressed up to or just below the region of the renal arteries. It can be performed at a normal temperature and requires the blocking of the renal artery for only a very short period of time.

In Case 2, there were severe arteriosclerotic changes of leg arteries and occlusion of the superficial femoral artery (hence adequate runoff was hardly expectable) and of the right femoral artery (after the previous reconstructive surgery), in addition to the aforementioned renal vascular hypertension. Under such circumstances, arterial grafting, even if done by the method mentioned above, was likely to become occluded and, moreover, was considered to inflict too great a surgical stress upon the patient. For these reasons a decision was made to have recourse to a splenorenal and superior mesentericorenal arterial bypass operations.

The splenic artery, which was found to be extraordinarily developed, was anastomosed to the renal artery, during which operation the regurgitating blood from the renal artery was let out and blood clots and intimal debris were washed out under the influence of topically used heparin in an effort to prevent renal embolism. Clamping of the renal artery could be released in a matter of 15 minutes.

LIBERTINO reported two cases of hepatic renal artery bypass with excellent results⁷¹.

In Case 3, surgery is apparently not indicated here, since the patient no longer has any distal organs and tissues to be perfused. Careful monitoring of the patient for further progression of occlusive lesion, needless to say, is indicated. Although bilateral functional deficiency of the kidneys is demonstrable on DIP, there is a significant diuresis at the present time, with some slender communicating channels of extrarenal artery origin that can be visualized in the right kidney. It seems that this contracted kidney retains its minimal function. Probably by virtue of this diuresis, the patient is able to adapt himself well to hemodialysis regimen.

Summary

Four cases of high aortoiliac occlusion have been presented in some detail.

Where impairment of renal function becomes manifest during the course of LERICHE syndrome, it is necessary to take appropriate therapeutic measures, e.g. surgery for reestablishment of blood flow through the narrowed or occluded segment, as early as possible on the basis of reliable aortographic findings. Benefit that may be elicited from hemodialysis in the preparation of the patient for surgery should also be considered.

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和文抄録

高位腹部大動脈閉塞症の臨床的研究

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腹部大動脈分岐部の atherosclerosis と血栓症による閉塞は、その特異な臨床症状より、Leriche 症候群と呼ばれている。閉塞は、初めは分岐部付近に限局しているが、緩慢な経過をたどって次第に上方に波及し、まれには腎動脈に及ぶことがあり、high aortoiliac occlusion あるいは high Leriche syndrome と称され重篤な腎機能不全にいたる。

われわれは4例の高位腹部大動脈閉塞症を経験し、2例には腎動脈血行再建術、人工透析により救命することができた。腹部大動脈閉塞の経過中に、腎機能障害をみる時、的確な腹部大動脈所見より、場合によっては人工透析の助けをかりて、早期に血行再建術の計画をたてる必要がある。