phrenic deterioration, but was able from the mental hospital to hold down a semi-skilled job in a factory earning £18 a week. This situation seemed pretty stable and he was doing so well he was discharged from hospital, where he had grown some roots. He had no home to go to, the "digs" he found were not to his liking, and in no time he was back in hospital unable to work at all. He has since been discharged again, but was unemployed and a burden on the tax payer with little hope of improvement.

It seems a pity the stable situation of working from a hospital, where he felt secure, had to be broken.

This I feel is a serious problem, although I am not suggesting it is a large one. Most schizophrenics can live away from the hospital environment. Of the 55 schizophrenics alive in 1971 from our practice, I think that about three who live in the community would be better in some kind of institution. Only 11% were long-stay patients, and as the years pass this figure will drop even further, but there will always be a hard core of chronic sick who do better away from home. No one

wishes to see the deterioration of hospital neurosis affecting these patients, but neither should they be allowed to destroy family life. Perhaps the provision of small hostels with suitable supervision will be found to be the answer.

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Hospital Topics

Extended Deep Femoral Angioplasty

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Summary

At present reconstructive arterial surgery for atherosclerotic disease below the level of the inguinal ligament is restricted to femoropopliteal bypass grafts. We have found a new operation, which we call extended deep femoral angioplasty, to be effective not only in some cases where bypass is possible but also in many cases where it is impossible because of a poor run-off, lack of a suitable vein, or even when a bypass has failed. In a consecutively treated group of 34 patients operative reconstruction was limited to the deep femoral artery and a success rate of 65% was achieved. Most gratifying was the saving of a leg in eight patients in whom bypass was impossible.

Introduction

The importance of the deep femoral artery (profunda femoris) as an alternative main carrier of an adequate blood supply to the lower limb was underestimated in the early years of vascular surgery. In cases with arterial lesions proximal and distal to the inguinal ligament, however, proximal reconstruction usually sufficed so long as a good flow of blood could be

established in the deep femoral artery.¹⁻³ This stimulated some surgeons to operate on the deep femoral artery when an autogenous femoropopliteal graft was either undesirable or impossible.⁴⁻⁷ Their encouraging results suggested to us that operations on the deep femoral artery alone might have even wider applications.

The incidence of atherosclerotic occlusion of the deep femoral artery seen in angiograms is between 4 and 6%.^{8,9} Stenosis of the deep femoral artery has been reported in 10 to 12% of patients with peripheral arterial disease.^{9,10} Waibel⁵ pointed out that there is a high incidence of posterior atherosclerotic plaques that run from the common femoral artery well into the division of the deep femoral trunk. Cormier and Dumas¹¹ found that plaques in the deep femoral artery are restricted to the posterior wall of the artery in 80% of the cases. Hence their depiction by angiography is difficult or impossible in frontal views. Other difficulties in the anteroposterior view are that the origin of the deep femoral artery may be obscured by a partially or totally patent superficial femoral artery and the deep femoral artery is often foreshortened.¹² In 15% of cases there is not a single trunk for the deep femoral artery; some or all the branches have separate origins from the common femoral artery.¹¹

Our findings have been similar except that in atherosclerosis of the deep femoral artery not only the orifice but often a considerable length of the vessel is affected, even when the lumen appears smooth in the angiogram. Occasionally up to 13 cm must be dissected before a soft, pliable artery can be found. Plaque formation usually stops immediately proximal to a major bifurcation of the trunk (lateral circumflex excluded). Therefore at operation the artery must be cleared much more extensively than has been suggested. To stress this we describe the operation as "extended deep femoral angioplasty."

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Patients and Methods

For a period of 14 months in 1970 and 1971 we performed extended deep femoral angioplasty on all patients who needed arterial reconstruction and in whom the disease was mainly distal to the inguinal ligament. This operation was done whether or not the angiograms showed atherosclerosis in the deep femoral artery, whether a bypass procedure would have been feasible, and irrespective of the condition of the run-off below the knee. Forty-one patients were treated. Their mean age was 61.6 ± 7.3 years. The indication for operation in 21 was crippling claudication and in 20 pain at rest, pre-gangrene, and gangrene. Clinical and angiographic examination showed the aorta and iliac arteries to be reasonably patent in all cases. Five patients had previously been treated by femoropopliteal vein grafts that had failed and three had had lumbar sympathectomies without success.

EXTENDED DEEP FEMORAL ANGIOPLASTY

The operative procedure of extended deep femoral angioplasty is as follows. A vertical incision is made in the upper thigh over the femoral artery. The common, superficial, and deep femoral arteries are mobilized—the deep femoral down to the level at which it becomes soft and pliable. The branches of the deep femoral vein that cross the deep femoral artery may be the source of profuse haemorrhage and they must be divided and transfixed with care. The common femoral artery is opened and cleared of atheroma, usually for about 3 cm. The incision is extended down the deep femoral artery, which is similarly treated by endarterectomy. A patch of the long saphenous vein, 5–13 cm long, is then sutured to the opened common and deep femoral arteries. This about doubles the calibre of the deep femoral artery. The segment of vein is taken from near the ankle in the same leg so as not to interfere with a subsequent bypass operation, should that be necessary, and also because the vein near the ankle is less distensible than it is nearer the groin. A vein patch from the proximal part of the saphenous vein bulges and allows turbulence that may predispose to thrombosis. The wound is closed with vacuum drainage. Heparin (20 mg injected through a fine plastic catheter introduced into the deep femoral artery) is given only while the arteries are clamped. The operation is simple, takes about two hours, and blood loss is minimal. It can be performed in poor-risk patients.

Results

Patients were followed-up for periods of from 10 to 31 months. They were considered simply as "better" or as a "failure." They were recorded as better when claudication was no longer incapacitating, or pain at rest had disappeared, or gangrenous lesions had healed either naturally or after a minor amputation or débridement. Patients who did not improve to the above standard or continued to deteriorate were recorded as failures.

Two of the 41 patients died—one from haemorrhage and one from a myocardial infarction three weeks after operation—a mortality of 4.9%. Assessment in five patients was difficult because they either had pain due to nerve root compression or had also had a sympathectomy. These patients were excluded from the series. Of the remaining 34 patients 22 (65%) were considered to be better and 12 (35%) were rated as failures. There were 20 patients with either pain at rest or gangrene in whom no reconstructive procedure other than extended deep femoral angioplasty would have been feasible. In 8 (40%) of them the operation obviated the need for amputation. Three of them had had a femoropopliteal bypass graft that had failed.

To see what alternative procedures might have been done in these patients all the angiograms were viewed by one of us without knowing the results of treatment. This retrospective analysis showed that two patients in the "better" group could have had an aortofemoral reconstruction and five a femoropopliteal vein graft. In the "failure" group only two could have been treated by femoropopliteal vein bypass. In one man this was later successfully performed. In the other the limb deteriorated too far for a graft to be done.

Operative complications included three cases of haemorrhage (with one death and one loss of limb) and two of lymphocele. The haemorrhage in each case was thought to result from a technical fault in the handling of Dacron sutures. In the two that were explored the suture line had obviously become unravelled under the influence of a rising arterial pressure. These accidents arose early in the series, and afterwards we were obsessional in our care to tie multiple knots and to leave suture ends long. No further haemorrhages occurred in the subsequent two years. Of the two cases of lymphocele in the groin a temporary fistula developed in one. Aspiration is sometimes needed if the swelling becomes very tense. We have the impression that so long as diathermy is avoided and all small vessels are tied meticulously this complication can be prevented.

Six patients (14.6%) in the series came to amputation. All of them had pain at rest or gangrene. In one thrombosis of the angioplasty was secondary to postoperative haemorrhage.

Discussion

Extended deep femoral angioplasty was successful in 65% of 34 patients in our series, but the number of cases is too small and the follow-up period too short for us to suggest that this operation should replace that of autogenous femoropopliteal grafting. Nevertheless, though the patients were unselected surprisingly few (17%) were suitable for bypass grafting.

The result from an autogenous vein graft is admittedly better than that of an extended deep femoral angioplasty. A bypass graft delivers a large volume of blood to the tissues below the knee, claudication is completely relieved, and the effect on pre-gangrenous lesions is dramatic. After extended deep femoral angioplasty claudication is eased but seldom abolished, pre-gangrenous lesions heal more slowly than after a bypass, and more often there is need for a minor amputation. What heartened us was that patients with a poor run-off improved so much after deep femoral angioplasty that in eight cases otherwise inevitable amputation was avoided. In other cases a previously failed graft or a previously stripped saphenous vein made bypass grafting impossible.

Greatly needed is a way of knowing after exposure of the femoral arteries whether a bypass graft, an extended deep femoral angioplasty or lumbar sympathectomy, offers the best hope of success. At present the decision is based on what is seen in angiograms and what is found at operation. When atheroma is extensive in the common and deep femoral arteries in patients with atherosclerotic disease distal to the inguinal ligament we tend to perform a deep femoral angioplasty rather than a bypass graft, especially when the angiograms confirm our operative findings.

Since 1969 we have monitored all our arterial reconstructions by measuring arterial blood flow with an electromagnetic flowmeter before and after operation. We find this invaluable in detecting technical imperfections that might cause immediate failure of the operation owing to thrombosis or intimal flap dissection,¹³ but we have not yet proved it of value in predicting the long-term outcome of an arterial reconstruction. Nevertheless some trends are emerging. For example, among the "better" group in our present series of patients an increase of flow of more than 50% was achieved

after deep femoral angioplasty in 65% of patients, whereas among the "failure" group a similar increase in flow was achieved in only 12%. This is significant at the 10% level using the χ^2 test and applying Yate's correction.

We hope to find that measuring the flow in the deep femoral artery will provide another guide in deciding on the right operation. For example, if there were little atheroma and a high flow in the femoral artery and the run-off was good we would perform a bypass graft. If the run-off were bad and gangrene present amputation would be indicated or if there were pain at rest a sympathectomy. If the flow in the deep femoral artery were low a deep femoral angioplasty would be performed, unless both run-off and the quality of the saphenous vein were excellent. In that case a combination of bypass vein graft and angioplasty of the deep femoral artery would be preferable.

This tentative scheme, which we have adopted, will be the subject of a later report. All we can say so far is that extended deep femoral angioplasty will achieve a highly significant degree of success when bypass grafting is impossible or has

failed. We are exploring further the indications for extended deep femoral angioplasty vis-à-vis bypass vein grafting.

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Large-bowel Perforations in Patients Undergoing Sigmoidoscopy and Barium Enema

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Summary

Perforation of the large bowel can occur as a complication of sigmoidoscopy, rectal or sigmoid biopsy, and even of a simple cleansing enema. If the perforation is extraperitoneal there may be no early symptoms and consequently there may be delay in diagnosis. The risk of perforation during these procedures is small but it should not be ignored. The performance of a barium enema shortly after a rectal or sigmoid biopsy may slightly increase the risk by converting a partial perforation into a complete one. Precautions can be taken to minimize the hazard.

Introduction

Sigmoidoscopy, rectal biopsy, and the barium enema examination are so widely used in the investigation of disease of the large bowel, and there have been so few reports of serious complications arising from their use, that these procedures are apt to be regarded as virtually free from hazard. Each of them, however, can give rise to a perforation of the wall of the bowel, even when it is healthy, and we believe this risk should not be ignored.

In the present paper we report, as examples, some of our own cases in which the bowel was perforated in patients undergoing these investigations, and some other cases of which we have personal knowledge. We also discuss some technical details to which we think attention should be given in order that the risks of damaging the bowel may be minimized.

Perforation during Cleansing Enema

It is common knowledge that introduction into the rectum of a hard object such as the nozzle of a Higginson's syringe can

injure the bowel. It is perhaps not so well known that the rectal wall, even in the absence of disease, can be perforated by the tip of a rubber catheter introduced for the purpose of administering a simple cleansing enema. This may happen if a relatively inflexible catheter is introduced in such a way that its tip impinges heavily on the anterior wall of the rectum.

A large-bowel perforation during the administration of a simple enema can also occur at a site which precludes injury by the catheter as the cause. In that event the perforation occurs at some point where the bowel is diseased and the presumptive cause is a rise in the intraluminal pressure, perhaps brought about by an active contraction of the bowel. We know of one such case in which the perforation occurred in the caecum where there was an unusual lesion—a localized area of gangrene.

In the following case the catheter used for a cleansing enema may have injured the bowel.

Case 1.—An 84-year-old woman suffering from constipation was found to have a palpable and tender descending colon. In preparation for a barium enema examination a saline enema was administered by gravity feed through a funnel and tube and a No. 14 F.G. soft-tipped rubber catheter was used. The entire procedure was uneventful, the patient made no complaint of pain, and all the enema fluid was apparently recovered. Six hours later the patient was in a state of shock, with distended abdomen and diminished bowel sounds. At laparotomy after the patient had been resuscitated, diverticular disease of the descending colon and sigmoid were found and there was a perforation in the lower sigmoid.

Perforation due to Sigmoidoscopy

Perforation of the bowel can be caused by unskilled insertion of the sigmoidoscope; by attempting to force the instrument past an organic stricture or persistent area of spasm¹; and also by the sudden movement of a nervous patient during the examination, as the following case indicates.

Case 2.—A 45-year-old woman gave a two-year history of episodes of colicky lower abdominal pain and diarrhoea. Sigmoidoscopy was performed on a sigmoidoscopy table, with the patient tilted head downwards at an angle of about 60° from the horizontal.

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