CASE REPORTS

SADDLE EMBOLUS OF THE AORTIC BIFURCATION TREATED BY EMBOLECTOMY

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Sudden occlusion of the aorta usually occurs at its bifurcation and is due to lodgement of an embolus. A blood clot sufficiently large to straddle the aorta usually comes from the atrium in a case of mitral stenosis. The importance of this ætiological factor was stressed by Banowitch and Ira (1928). Hermann *et al.* (1943) discussed the clinical manifestations and treatment of this condition. By 1950, 200 cases of saddle embolus of the aorta had been recorded; 75 per cent of these died. Of these cases, eight were reported to have been cured by conservative management and there were four spontaneous recoveries. Up to this time, Albright and Leonard (1950) recorded 26 cures after successful embolectomy and Ewing (1950) also recorded 13 more survivals, including two of his own cases.

Case Report

A woman, aged 27, with mitral stenosis, was admitted into hospital for assessment of suitability for valvotomy. She had normal sinus rhythm. Her blood pressure was 118/70. There was a systolic murmur over the left second and third intercostal spaces lateral to the sternum which led to the suspicion of atrial septal defect. Electrocardiographic and radiological findings were consistent with the diagnosis of mitral stenosis. At cardiac catheterization the pressure in the right atrium was within normal limits but the right ventricular pressure was raised (390 mm. of saline). The catheter could not be introduced through a septal defect after repeated trials, and failed also to enter the pulmonary artery.

Two days later, while trying to get out of bed, she felt a sudden "shock-like" sensation in both lower limbs followed by intense pain in the legs and feet. Within half an hour, the pain of the right leg and foot became agonizing, while on the left side, the pain abated and there was only numbness.

Clinical findings. When examined about an hour after the onset she was restless and in great agony. The temperature was normal. There was slight sweating of the forehead and face. Pulse was 110 a minute. Blood pressure measured 146/90. There was no abdominal tenderness.

The following signs were found on examination of the inferior extremities. Both legs were cold, the right more than the left. All arterial pulsation below Poupart's ligament was absent in both limbs. On the right side, there was loss of power of all the muscles of the leg and she could not move her ankle or toes. There was only slight loss of power of the muscles of the thigh and flexion and extension of the knee could be carried out. There was complete loss of sensation up to the knee on the right side. On the left side, the loss of power and sensation below the knee was very slight. The diagnosis of saddle embolus at the aortic bifurcation with complete blockage of the right common iliac and partial blockage of the left was made. An operation was decided upon. While preparations for this were being made, slight cyanosis developed in the toes and foot of the right side.

Operative procedure. The operation was started at about five and a half hours after the occurrence of embolism. The abdomen was opened by a 15-cm. right paramedian incision. With the patient tilted in 30 degree Trendelenburg position, the bifurcation of the aorta and the two common iliacs were exposed by incising the posterior parietal peritoneum. There was absence of pulsation in both common iliacs, as also at the aortic bifurcation. A fair sized bulge could be seen at this site, particularly at the commencement of the right common iliac artery and the abrupt contrast in the size of the vessel between the bulged portion and the narrow portion below it was striking.

Broad cotton tapes were passed around the abdominal aorta below the inferior mesenteric artery and around the right common iliac distal to the thrombus. A 1·25-cm. incision was made on the anterior surface of the right common iliac artery directly over the swollen portion and just distal to the aortic bifurcation. As the lips of this incision separated, the dark thrombus was clearly discernible.

A No. 6 catheter lubricated and connected to a suction tap, was manœuvred beside the thrombus between it and the vessel wall but dislodgement by this method appeared improbable and the attempt was abandoned. The lower tape had been tightened during this procedure. The trunk of the abdominal aorta was next gently squeezed by fingers just proximal to the thrombus and as this was done, the thrombus could be seen protruding in the opening between the lips of the incision and suddenly came out with a great deal of force followed by a huge gush of blood. As the tape around the abdominal aorta was tightened, the flow of blood was quickly controlled. The walls and the lumen of the vessel appeared healthy on inspection. The opening in the common iliac was closed by one layer of eversion continuous mattress suture using 5/0 Deknatel silk on a half-curved atraumatic needle. The distal tape was loosened first and after about 3 minutes of local pressure over the suture line, the aortic tape was also loosened. There was no significant leak and no additional sutures were required. Vigorous pulsation came back immediately to both external iliac and femoral arteries. The posterior parietal peritoneum was repaired and the abdomen closed.

About half way through the operation the patient developed auricular fibrillation and the ventricular rate went up to 160 a minute. I.V. digoxin was given, and this controlled the ventricular rate to some extent so that at the end of the operation, the patient had a heart rate of 120 a minute still with fibrillation.

Six hours after the operation, the heart rate had fallen to 110; fibrillation was still present but there was spontaneous reversion to sinus rhythm a few hours later. Pulsation was present at all levels of the left leg, and at the femoral and popliteal levels on the right side, but was absent in the right posterior tibial and right dorsalis pedis at the ankle. However, both the limbs were warm and there was no doubt about the restoration of the essential circulation in the right foot and leg. The patient was able to move her legs but there was still partial loss of sensation and motor power over the right foot and leg.

Twenty-four hours later, there was pain over the right calf which was somewhat swollen, œdematous and indurated. It was quite tender to pressure. Diagnosis of deep venous thrombosis at this level was made. Femoral and popliteal pulsations were present but pulsations in the posterior tibial and dorsalis pedis were still absent. The essential circulation in the right foot and leg was still considered adequate. There was partial loss of sensation and motor power in the right leg and foot. The limb was surrounded in an ice pack and I.V. heparin therapy was started, the calf œdema and induration gradually disappeared over a course of about three weeks.

At the time of reporting, the sensory loss has disappeared completely on both sides but there is residual weakness of the dorsiflexors and evertor muscles of the right foot. Pulsations have also returned in the right posterior tibial and dorsalis pedis arteries.

Discussion

As the embolism occurred within 48 hours of cardiac catheterization, it may be suspected that the procedure was in some way responsible for the complication. However, as the left atrium was not entered, it is highly improbable that there was any causal relationship.

There is divergence of opinion as to the best method of exposure of the site of lodgement of the embolus. Murray (1943), who reported five personal cases, preferred the extraperitoneal approach. The intraperitoneal exposure, however, is direct, easy, and allows of better control of the vessels. Some surgeons have preferred incising the aorta directly instead of the common iliac artery and Ewing (1950), after his experience of two cases, was of this opinion. In the present case, the incision directly over the bulge in the common iliac appeared very satisfactory and the clot discharged itself *en masse* with slight proximal squeeze.

It may be noted that pulsation did not return in the dorsalis pedis and posterior tibial arteries on the right side for about three weeks after the operation. This may have been due to dislodgement of a fragment from the main embolus at the time of operation and its arrest at the lower level. This explanation appears to be unlikely as the large sized thrombus was discharged *en masse* and was found to be unbroken and intact (Fig. 1). Also, the tape around the common iliac had been tightened during manipulation, reducing still further the chances of distal embolism.

Another explanation for this delay could be vascular spasm at distal levels of the limb due to

prolonged ischæmia of about five-and-a-half hours duration between the onset of the embolism and its relief by operation. This hypothesis appears most likely in the present case and it might also have contributed to the thrombotic complication in the deep veins of the calf, which developed 24 hours after the operation and gradually subsided. Possibly, a simultaneous lumbar sympathectomy at the time of embolectomy could have obviated this condition and it appears to us that when the interval between embolism and operation approaches six hours or more, sympathectomy should be seriously considered. Albright and Leonard (1950) are of similar opinion. In the present case, the auricular fibrillation which occurred during the operation made us decide against further prolongation of the operation.

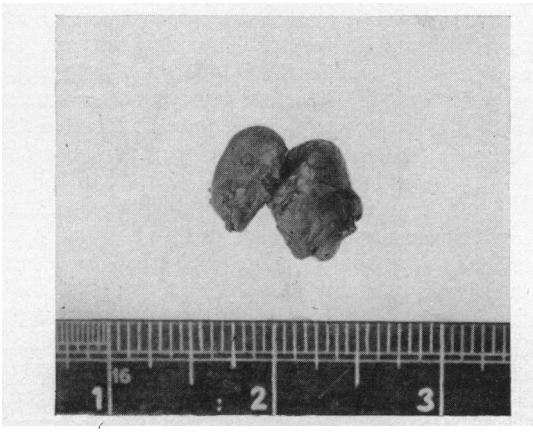

FIG. 1.—Photograph of aortic embolus (contracted, × 3/4, after preservation in formol saline).

Another interesting feature was the remarkable localization of loss of power and sensation below the knee. In contrast, the upper half of the limbs were only slightly affected. It is probable that the difference in the arterial supply of the femoral and sciatic nerves may have been responsible for this disparity since the upper roots of the lumbar plexus derive their blood supply from above the aortic bifurcation, whereas the arterial supply of the sciatic nerve comes mostly from the internal iliac artery.

Summary

A case of mitral stenosis awaiting valvotomy suddenly developed a saddle embolus at the aortic bifurcation. This was treated by embolectomy. Comments are made on certain interesting features before, during, and after operation.

We are thankful to Dr. A. K. Dutt Gupta, Principal, Nilratan Sircar Medical College, for permission to publish this case. Our thanks are also due to Dr. S. Chatterjee for taking the responsibility of administering the anæsthetic.

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