DISSECTING ANEURYSM OF THE ABDOMINAL AORTA

REPORT OF A CASE WITH REPAIR OF PERFORATION*

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DISSECTING ANEURYSM of the aorta generally pursues a rapidly fatal course. Although clearly a mechanical problem, and therefore potentially one of surgical significance, dissecting aneurysm, with its threat of massive hemorrhage, has not, in the past, been considered a surgical emergency.

When degenerative disease of the medial coat of the aortic wall progresses to the point of necrosis and mural hemorrhage, dissection proceeds within the layers of the media. Usually, but not always, the blood tears its way through the intima so that the lumen of the aorta communicates with the dissection. A breakthrough usually occurs at a variable distance from the site of primary intimal rupture. The dissecting column of blood ruptures most often into the pericardium and causes death by pericardial tamponade.[1] Dissection may enter the vena cava, pulmonary artery, sinus of Valsalva or right ventricle. The aneurysm may rupture back into the lumen of the aorta or break through the flimsy confines of the posterior parietes into the free spaces of pleura or peritoneum. Although occasionally a dissecting aneurysm may be contained within the aortic wall and become healed, in 80 to 90 per cent of cases, fatal external rupture occurs hours or days after the first symptoms.[1, 2, 9, 12, 13]

The delay which usually occurs between onset of symptoms and the terminal hemorrhage, makes the clinical diagnosis of dissecting aneurysm possible in a fair percentage of cases—20 to 40 per cent in recent series.[1, 2, 3, 5, 8, 9, 10, 11] This fact, together with the terrifying prognosis, would appear to justify an attempt to cope with the hemorrhage surgically by closing the perforation whenever the diagnosis of dissecting aneurysm is made.

Dissecting aneurysm commonly originates in the ascending aorta near its base.[3, 6, 12] Other sites of origin are fairly frequent, and in the case reported here, the perforation occurred in the lower part of the abdominal aorta at a point distal to the origin of the renal arteries.

A method for dealing with perforation of the abdominal aorta is described in the following case report. The patient was operated upon 18 hours after the onset of symptoms. He survived aortorrhaphy to die of renal insufficiency seven days after operation.

CASE REPORT

C. K., J. H. H. (587640). A 50-year-old man, was referred to the Johns Hopkins Hospital on October 15, 1951. The patient had been treated for 4 years by his family physician for hypertension and heart trouble, but had never been incapacitated.

Twenty-four hours before admission to the hospital, the patient had attended a concert, during which he held his urine with considerable discomfort, despite a great urgency to void. After-

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ward, he voided and then had a sharp pain in the left lower quadrant, which radiated to the groin. The pain continued and was followed by restlessness and general discomfort. There was great weakness. His physician was called and found the patient to be in profound collapse and sent him immediately to the hospital. He was admitted to the Medical Service.

Physical Examination: The patient was in circulatory collapse. The temperature was 99, pulse 140, blood pressure 30/10. There was pallor and sweating; the heart was slightly enlarged to the left; the lungs were clear. The abdomen was slightly distended and there was fullness and deep tenderness in the left hypochondrium and flank. The liver and spleen were not palpable. The dependent pulses were symmetrically present bilaterally.

Hospital Course: Laboratory examinations revealed a slight anemia with hemoglobin 12.0 Gm., red blood cells 4.8 million per cubic mm., and hematocrit 39 per cent. The blood sugar was 390 mgm. per cent, CO_2 combining power 18.7 Meq./liter and serum chloride 93.3 Meq./liter. The urinalysis showed sugar 4 plus, acetone 2 plus, and diacetic acid 3 plus. Clotting time and bleeding time were normal. A roentgenogram of the abdomen showed diffuse haziness over the lower left portion.

The patient was observed for a period of 4 hours. During this time, he was given blood transfusions and infusions of glucose with insulin. He remained in collapse, and the fullness in the left flank and hypochondrium increased. Aspiration of the flank produced bright red blood. A diagnosis of retroperitoneal hemorrhage was made and operation performed.

Operation: Cyclopropane and ether were administered through a closed orotracheal system. A long transverse incision was made across the left side of the abdomen extending into the left flank. A large retroperitoneal hematoma containing an estimated 2500 cc. of fresh and clotted blood was evacuated. Furious bleeding under arterial pressure was encountered in the region of the descending aorta at a point below the origin of the renal artery and the inferior mesenteric artery. With the hemorrhage controlled manually, the aorta was exposed proximal to the perforation. It was occluded by compressing it against the lumbar spine with a stick sponge. The site of hemorrhage was then inspected. It consisted of a transverse tear through the left anterior wall of the aorta proximal to its bifurcation. The exposed surfaces were thickened, and a yellow plaque was demonstrated at the site of rupture. The tear was repaired with interrupted sutures of 00 silk on Ferguson intestinal needles. Sutures were placed vertically across the perforation and no attempt was made to evert the suture line or oppose intimal surfaces accurately. When bleeding was controlled, the wound was closed with silk around a small gelfoam pack and a Penrose drain. The patient's condition was desperate throughout the procedure, but improved during closure. Two and a half liters of blood were administered rapidly.

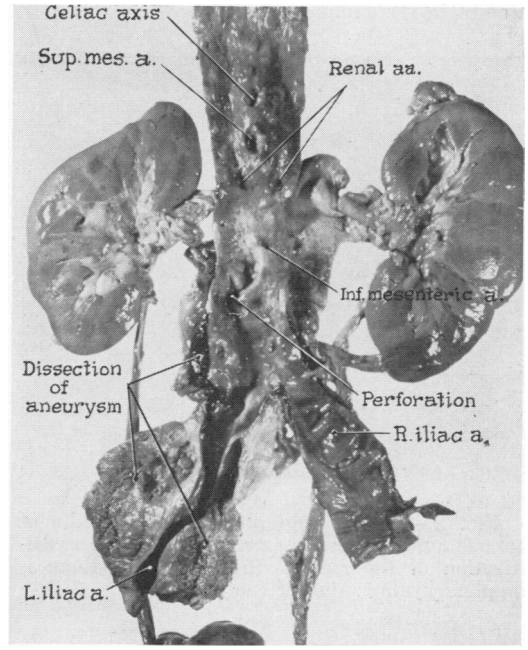

FIG. 1.—Photograph of autopsy specimen. The aorta has been opened along its posterior aspect. The site of the perforation and extent of the dissection are indicated.

The postoperative impression was that this was a spontaneous perforation of an atheromatous aorta. The presence of the dissecting aneurysm was not determined.

Postoperative Course: The patient regained consciousness and responded normally following operation. His blood pressure rose and remained between 110/60 and 180/100. Abdominal distention occurred, but responded to enemata and administration of diisopropylfluorophosphate, prostigmine and pitressin. However, the urinary output was suppressed throughout the postoperative period and oliguria was accompanied by steadily rising non-protein nitrogen. Despite careful limitation of fluid intake and administration of protein-free high fat, high carbohydrate feedings, renal insufficiency continued and the patient died in a state of uremia on the 8th postoperative day.

Autopsy: No. 23294. Dr. G. Rainey Williams. October 23, 1951. The heart weighs 300 Gm. It is hypertrophied with disproportionate hypertrophy of the left ventricle. The valves are delicate, although there is a little calcification at the base of the aortic valve. There is delicate atheroma in the sinus of Valsalva and ascending aorta. The walls of the coronary artery are diffusely thickened, but the lumina are all wide. The lungs are expanded and free of adhesions. There are no thrombi in the pulmonary artery.

FIG. 2.—Photomicrograph (x 80) of media of thoracic aorta. There is extensive abnormal vascularization of the media. In other fields there is complete hyalinization of the media.

The abdominal cavity contains 100 cc. of bloody fluid. In addition, there is a small amount (75 cc.) of clotted blood in the left side of the abdomen. The organs are normally arranged. The spleen is irregular in shape, the capsule is roughened and there is a small infarct. The liver is large and soft, and shows a peculiar accentuation of pattern suggestive of loss of hepatic substance. Microscopic study shows widespread central necrosis. Small infarcts are also present in the adrenals, pancreas and brain.

The right kidney weighs 200 Gm., the left 215 Gm. The kidneys are pale and flabby and each contains a large cortical cyst at the upper pole. There is an anomalous renal artery to the lower pole of the left kidney, but no arterial obstruction is present. The capsules are stripped easily. On cut section, the markings are completely obscured by a faded color. The architectural landmarks, however, can be identified and are preserved in normal portions. Microscopic sections showed severe damage to the tubular epithelium, particularly in the distal tubules. This is the pattern usually identified as lower nephron nephrosis.

The aorta is greatly altered (Fig. 1). There are atheromatous plaques in its arch and in the descending aorta. Just below the level of the inferior mesenteric artery, there is a transverse split in the intima of the aorta, and this connects with the dissection through the media, which extends from this point down into both iliac arteries, on the right for 6 cm. and on the left for 10 cm. The dissection is filled with partially organized thrombus and there is fibrinous roughening of the surface of the split. The adventitia just below the intimal split is reddened by extravasated blood, and this area is secured by several fresh, small sutures. The sutures have incorporated both the inner and outer walls of the dissection. No dissection has occurred in the aorta which can be recognized as postoperative. The aortic media shows frequent small delicate vessels, far in excess of those usually seen, and not similar to the endarteritic lesions of luetic aortitis. This is the type of medial vascularization that has been long associated with dissecting aneurysms.

Anatomical Diagnosis: Dr. Morgan Berthrong. Vascularization of aortic media. Dissecting aneurysm of abdominal aorta with extension into iliac arteries and perforation. Retroperitoneal hematoma. Surgical suturing of perforated aortic wall. Lower nephron nephrosis.

COMMENT

Dissecting aneurysm originating in the abdominal aorta is rare[4] and the correct diagnosis was not made in this case, the preoperative diagnosis being retroperitoneal hemorrhage. At the time of operation, it was felt that this was a spontaneous perforation of the aorta without dissection. Autopsy demonstrated the dissection distal to the perforation. Spontaneous perforation of the aorta and dissecting aneurysm are in most instances[12] manifestations of the same pathological process, that is, medial degeneration and necrosis. In spontaneous perforation of the aorta, the intimal tear and external rupture occur at the same place and there may be no dissection of the aortic wall. In this case, dissection occurred centrifugally from the site of primary tear, but external rupture took place at the site of the intimal tear. It was possible, therefore, to close the two perforations as one.

Although the pathogenesis of the medial derangement associated with dissecting aneurysm is not completely agreed upon, this particular case presents the picture of abnormal vascularization of the media (Fig. 2) leading to hyalinization of the media and hyaline necrosis.[7, 8] The cystic and mucoid areas often seen in the medial layer in many cases of dissecting aneurysm are not found; however, the vascularization changes are perfectly typical of what one sees so often in cases of dissecting aneurysm.

Regardless of the pathological process responsible for dissection, it is apparent that once dissection has begun, the chances of recovery under the usual circumstances are slim—10 to 15 per cent in reported series.[2, 9] The only hope for the remaining 85 to 90 per cent of patients with dissecting aneurysm should depend upon correct diagnosis and immediate operation. An attempt at closure of the aortic perforation should be made not only in cases such as this in which the dissection is limited to the abdominal aorta, but in cases in which the perforation starts at the usual site in the thoracic aorta at the base of the heart.

SUMMARY

1. Dissecting aneurysm of the aorta is a mechanical emergency of surgical significance.

2. The variable interval between onset of symptoms and terminal secondary hemorrhage permits a clinical diagnosis in many cases.

3. Operation in an attempt to repair the perforation is justified as soon as the diagnosis of dissecting aneurysm is made.

4. A case of dissecting aneurysm of the abdominal aorta with perforation is reported. Aortorrhaphy was performed. The patient survived seven days and died of renal insufficiency.

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