

RUPTURE OF AN UPPER ABDOMINAL AORTIC ANEURYSM INTO THE DUODENUM WITH MASSIVE GASTRO-INTESTINAL HAEMORRHAGE

A CASE REPORT

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Although rupture is the commonest cause of death in untreated aortic aneurysms (Gledman, 1957; Estes, 1950) rupture into the gastro-intestinal tract occurs rarely. In a review of the literature Rottino (1931) found 31 reported cases to which he added a personal one. Later, Hunt and Weller (1946) collected a further 8 cases and reported one of their own. Of the 4 cases reported by Kubota et al (1959), one cannot be rightly included as no communication had been demonstrated between the aneurysm and the gastro-intestinal tract. They had compiled a total of 63 cases from the literature and the addition of their 3 cases brought the total to 66. Since their paper, a further 16 cases have been reported and together with the case to be reported brings the total to 83. There are doubtless other cases buried in the large series of abdominal aortic aneurysms presented in other reports and which are unavailable for inclusion.

CASE REPORT

A young Chinese woman, 30 years old, was admitted on 6th January, 1961 after a sudden attack of haematemesis and melaena early that morning. Except for slight pallor her condition then was satisfactory. A pulsatile mass was palpable in the epigastrium. On the day of admission she had another bout of haematemesis in the ward and went into shock from which she recovered after a transfusion of 3 pints of blood. Massive melaena on the 4th and 5th days after admission required a further transfusion of 3 pints of blood and she was then referred for surgical treatment with the diagnosis of abdominal aortic aneurysm with rupture into the gastro-intestinal tract.

Kahn Test: strongly positive.

Preliminary exploration through a midline abdominal incision revealed a saccular aneurysm of the aorta behind the pancreas and duodenum, its upper limit being just below the diaphragm. The fourth part of the duodenum was densely adherent to it. The incision was extended into the left chest through the eighth intercostal space and the lower end of the thoracic aorta isolated and taped to provide proximal control. The abdominal viscera were reflected to the right and the aneurysm was then seen to arise from the

anterior aspect of the aorta in the region of the coeliac, renal and superior mesenteric arteries (Fig. 1). Its lower limit was about 3 cm. above the origin of the inferior mesenteric artery which was much larger than normal. The left renal vein ran along the sulcus of the lower border of the aneurysm. A secondary outpouching arose from the lower left portion of the main sac and to this the fourth part of the duodenum was adherent. The coeliac axis had been absorbed into the sac and its three branches rose directly from the aneurysm. The left renal artery also took origin from it but the right renal artery was found to arise from the non-aneurysmal posterior portion of the aorta. The superior mesenteric artery had also been partly absorbed so that two large jejunal branches came directly off the sac.

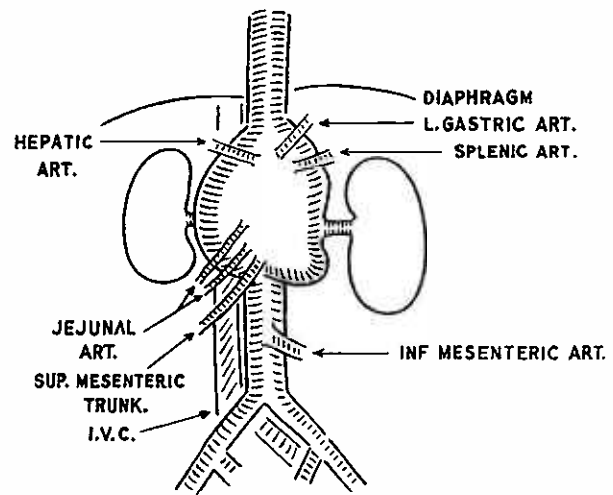


Fig. 1. Diagram of Aneurysm in situ showing disposition of the visceral branches.

A Teflon prosthesis was constructed, with 3 side-arms for the right renal, superior mesenteric and hepatic arterial anastomoses. A shortage of suitable prostheses made it necessary to plan to anastomose the left renal artery directly to the main body of the prosthesis. The left gastric and splenic arteries were divided between ligatures and the spleen removed.

As no hypothermia was used, the method of DeBakey et al (1958) was adopted to minimise the period of arterial occlusion to the kidneys and the liver and small bowel. With a partial occlusion clamp on the lower end of the thoracic aorta the upper end of the prosthesis was anasto-

mposed to the excluded side of the aorta. The left renal artery was then detached from the aneurysm and sutured end-to-side to the aortic prosthesis. With the 3 side-arms clamped off another clamp was applied to the aortic prosthesis below the left renal anastomosis, the partial occlusion clamp on the thoracic aorta removed and arterial inflow to the left kidney restored (Fig. 2). Arterial occlusion to the left kidney thus lasted only 13 minutes. In the next stage, the abdominal aorta was transected just below

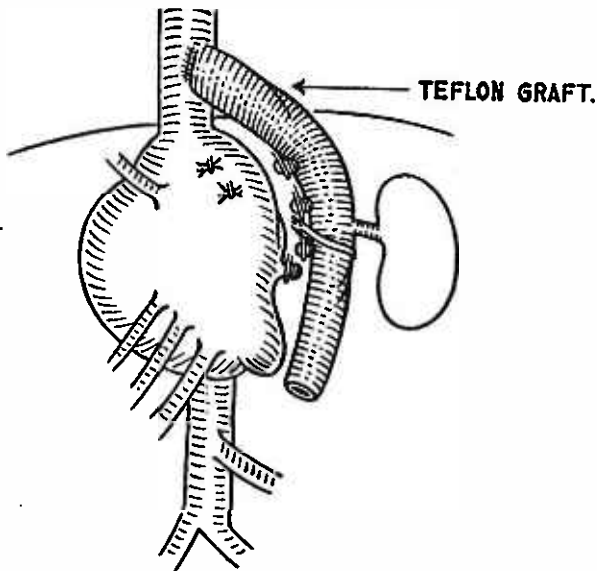


Fig. 2. First stage: Proximal end-to-side anastomosis between prosthesis and thoracic aorta and direct end-to-side anastomosis of left renal artery to prosthesis completed.

the aneurysm and the distal end anastomosed to the prosthesis end-to-end (Fig. 3). The final stage involved division of the abdominal aorta above the aneurysm, detachment of the hepatic, right renal and superior mesenteric branches from the aneurysm, resection of the sac and anastomosis of the visceral branches in the following order: right renal, then superior mesenteric (Fig. 4). As a vigorous pulsatile back-flow was obtained from the distal end of the hepatic artery, it was tied off and the corresponding side-arm ligated. The duodenal wall was absent where the aneurysm had been adherent to it and was closed in two layers.

Occlusion time for the right kidney was 104 minutes. The incisions were closed and a drain left in the left chest. A total of 12 pints of blood was transfused during the operation but in spite of this the patient's condition was poor throughout, probably due to continuing haemorrhage into the duodenum. At the end of the operation her blood pressure was 70 mm. Hg. systolic.

She remained in severe shock for the next 48 hours, requiring further transfusion of 2 pints

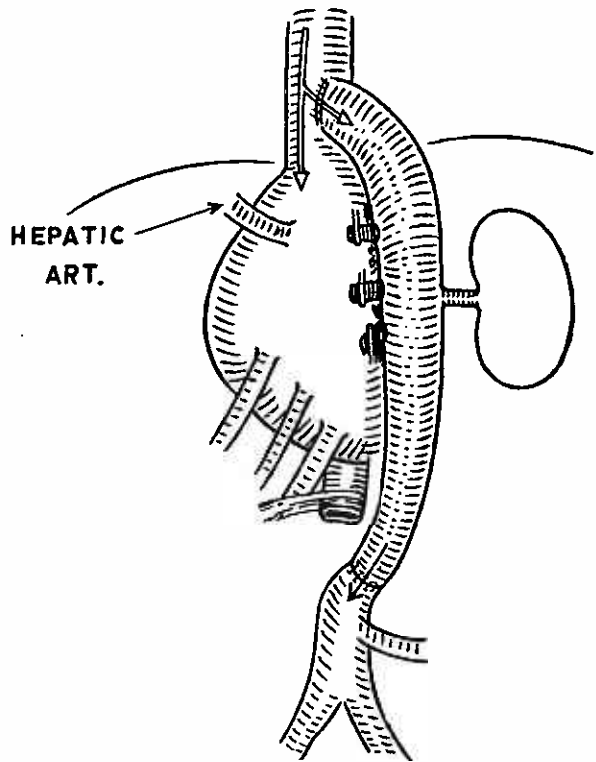


Fig. 3. Bypass completed by transecting abdominal aorta below aneurysm and end-to-end anastomosis of prosthesis to distal end of abdominal aorta.

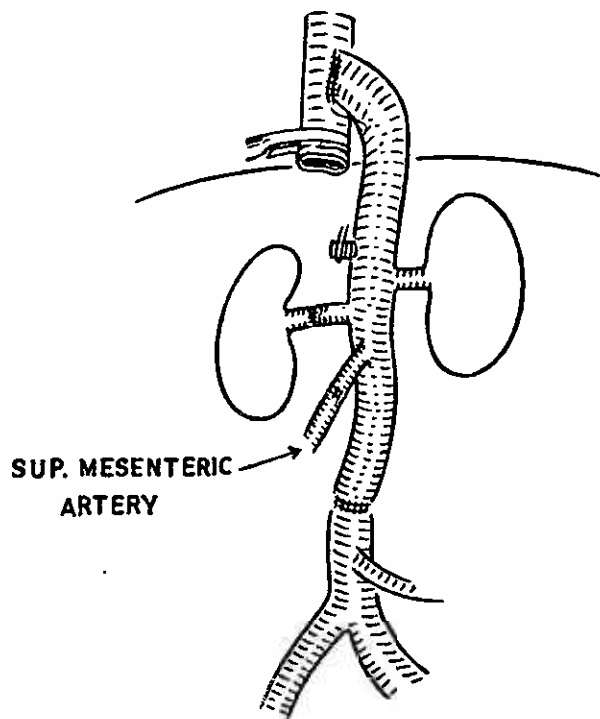


Fig. 4. Aneurysm resected, right renal and superior mesenteric anastomosis completed. Side-arm for hepatic artery tied off. Open end of thoracic aorta below end-to-side bypass anastomosis is controlled by clamp prior to suturing.

of blood and a phenylephrine infusion to maintain the blood pressure between 70 and 80 mm. Hg. No urine was passed on the first day, only 9 ml. of heavily blood-stained urine the second day and 28 ml. the third day. Her blood urea on the second day was 90 mgm.% and 140 mgm.% the third day. By the fourth day it was evident that renal function was not going to return although the blood pressure had stabilised around 100 mm. Hg. She died of renal failure 62 hours after the operation.



Fig. 5. Photograph of Resected Aneurysm, opened out to show interior filled with thrombus.

AUTOPSY FINDINGS

The aortic prosthesis was patent but lined by a layer of reddish brown fibrin strands concentrated mainly over the orifices of the left renal artery and side-branches (Figs. 6 (a) and (b)). All the visceral anastomoses had thrombosed. The stomach and small bowel had remained viable till death. The right kidney showed recent infarction at both poles. The left kidney was swollen and dusky red in colour with infarction in the upper pole. The left lobe of the liver showed recent infarction and yellow coagulative necrosis.

Histological examination of the aneurysm showed changes consistent with syphilitic aortitis.

DISCUSSION

Hæmatemesis and/or melaena and a palpable pulsatile abdominal mass are the two commonest clinical features of rupture of an aneurysm into the gastro-intestinal tract. Voyles and Moretz (1958) in an analysis of 63 cases collected from the literature noted that an abdominal mass was palpable in 44, of which 37 were pulsatile. Rupture may take place into any part of the bowel but occurs most commonly into the duodenum. In the 77 cases in which details of the site of rupture were available, 64 took place into the

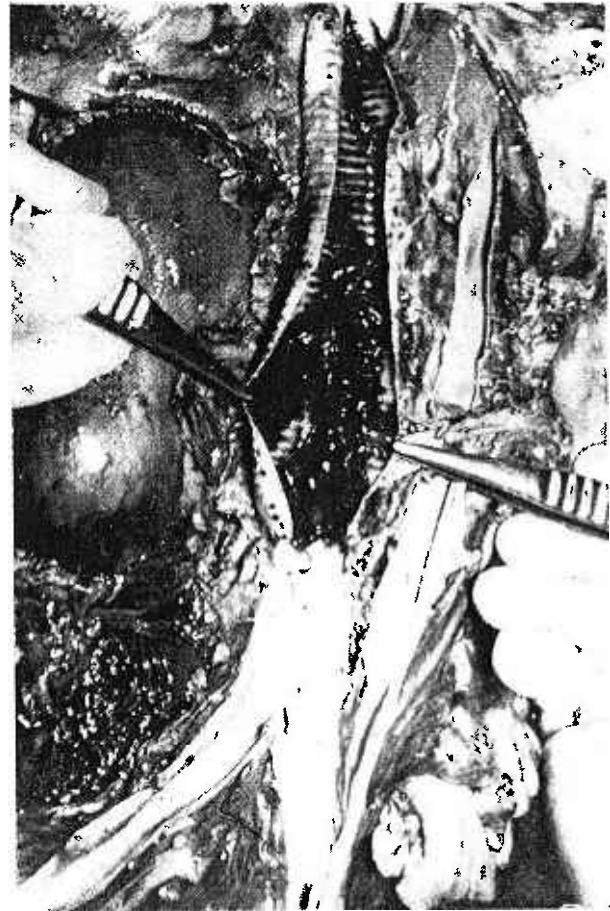
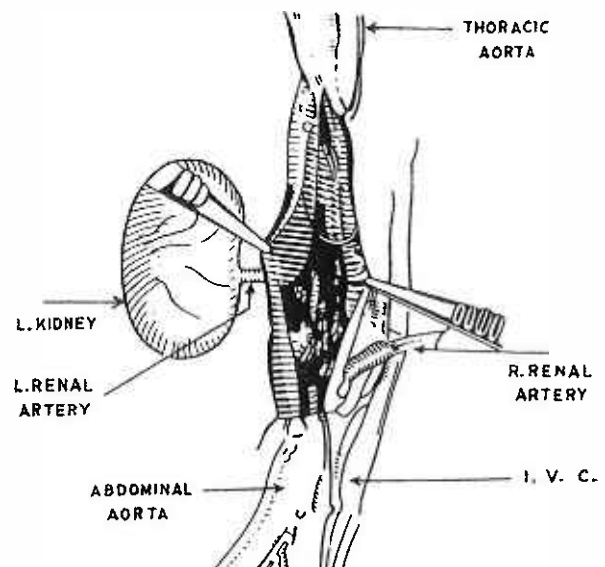


Fig. 6(a). Autopsy specimen: Prosthesis opened from the back to show luminal surface lined by thrombus.



PROSTHESIS OPENED FROM THE BACK SHOWING LINING THROMBUS

Fig. 6(b). Line diagram of Fig. 5(a).

duodenum, most of them into the third part. The frequency of involvement of the duodenum is explained by the anatomical relationships of the abdominal aorta. Rupture into the stomach occurred in 6 cases and into the small bowel in 7.

The luetic nature of this patient's aneurysm, confirmed by a positive Kahn Test, explained the unusual involvement of the upper abdominal aorta and her young age. In the series of 22 thoraco-abdominal aortic aneurysms reported by DeBakey et al (1958), 15 were due to syphilis. Of the 102 cases studied by Estes (1950) only 5 were syphilitic whereas 57.3% of Kampmeier's 73 cases (1936) and 58.3% of Scott's 96 cases (1944) were luetic. This is in keeping with the increasing importance of arteriosclerosis in the etiology of abdominal aortic aneurysms.

Resection and grafting of abdominal aortic aneurysms carry with it a 5-20% mortality (DeBakey, 1957; Erskine & Gerbode, 1959). Surgery of the ruptured aneurysm, however, is attended by much higher mortality rates and early experiences in most hands have been associated with 40-50% mortality (Javid et al, 1955; Savage, 1959). The problems imposed by aneurysms of the upper abdominal and thoraco-abdominal aorta are considerable and account for mortality rates between 25-50% in elective cases. Surgical experiences with these types of aneurysm are limited in view of their rarity. In this respect, the experience of DeBakey et al (1958) is unrivalled. In a series of 22 thoraco-abdominal aortic aneurysms there were only 8 operative deaths.

The main problem in the resection and grafting of the upper abdominal aortic aneurysms lies in the protection of the abdominal viscera, in particular the kidneys and liver, from the fatal effects of prolonged arterial occlusion. Hypothermia as a means of protection has been advocated and used but is said to be inadequate for periods in excess of 100 minutes (DeBakey et al, 1958). Controlled extracorporeal circulation with partial bypass of the left heart to the femoral and renal arteries as suggested by the same authors will prevent ischaemia but at the expense of the disadvantages and added risks of the extracorporeal circulation. The use of a temporary shunt with staged occlusion and grafting of the visceral and renal arteries and ultimate conversion of the shunt into a permanent replacement has been used with conspicuous success by DeBakey et al (1956; 1958). This method has the great advantage of simplicity and reduces the arterial inflow occlusion to the kidneys and important abdominal viscera to periods compatible with the minimum risk of anoxic damage. In this instance, the left kidneys was occluded for 13 minutes but technical

difficulties and inexperience resulted in a much longer period of 104 minutes in the case of the right kidney.

Opinions and reports vary as to the maximum period of ischaemia which can be safely tolerated by the kidneys. Periods from 37 to 90 minutes have been reported as safe (DeBakey et al, 1956) and are undoubtedly influenced by various factors as age, anatomical variations, pre-existing renal disease, etc. In general, periods of more than one hour are regarded as unsafe. Ellis et al (1955) resected and grafted an abdominal aortic aneurysm involving the right renal artery and reported satisfactory return of renal function after aortic occlusion of 135 minutes. In this instance it was not possible to assess the effect of the prolonged arterial occlusion of the right kidney. The necropsy appearances of the graft and both kidneys suggested that multiple emboli originating from the fibrinous thrombus were the cause of the numerous infarcts, ultimately resulting in complete occlusion of both renal arterial anastomoses. Such extensive thrombus formation on the inside of a Teflon prosthesis is the exception rather than the rule and the possible explanation is the stagnation of blood within the aortic prosthesis during the period between the completion of the left renal anastomosis and the lower end-to-end anastomosis between prosthesis and distal abdominal aorta (See Fig. 2).

Data regarding safe occlusion periods for the liver are not readily available and it has been suggested by DeBakey et al (1956) that 30 minutes is the maximum. In this case although the left lobe showed recent infarction the right lobe was normal, suggesting that the infarction was quite possibly due to embolism. The vigorous divided hepatic artery was evidence of adequate pulsatile back-flow from the distal end of the collateral circulation.

The commonest causes of mortality following resection and grafting of abdominal aortic aneurysms are shock and renal failure. The latter was undoubtedly responsible for this patient's death and was due to multiple infarcts in both kidneys and finally thrombosis of the renal arterial anastomoses.

Of the 82 previously reported cases, the only other case in which surgical treatment was carried out was that reported by Voyles and Moretz (1958) of a 62-year old man presenting with haematemesis and a palpable pulsatile tender abdominal mass. Excision and grafting with an Ivalon-Teflon prosthesis was successfully carried out but on the 34th post-operative day, a leak from the left common iliac anastomosis necessitated re-exploration and death took place three days later from a cerebrovascular accident.

SUMMARY

A case is presented of a young woman in whom gastro-intestinal haemorrhage was due to rupture of a syphilitic aneurysm of the upper abdominal aorta into the fourth part of the duodenum. Surgical treatment by excision and grafting was carried out but the patient died 62 hours after operation from renal failure.

This case illustrates that rupture of an abdominal aortic aneurysm into the gastro-intestinal tract may be compatible with survival for a period long enough for surgical treatment to be possible.

The literature is reviewed and 82 cases collected.

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REFERENCES

- DeBakey, M. E., Creech, Jr., O., Morris, Jr., G. C. (1956). Aneurysm of Thoraco-abdominal Aorta. *Ann. Surg.* 144: 549.
- DeBakey, M. E., Cooley, D. A., Crawford, E. S., Morris, Jr., G. C. (1958). Aneurysms of Thoracic Aorta. *J. Thoracic Surg.* 36: 393.
- Ellis, F. H., Helden, R. A., Hines, E. A. (1955). Aneurysm of the Abdominal Aorta Involving the Right Renal Artery. *Ann. Surg.* 142: 992.
- Erskin, J. and Gerbode, F. (1959). Aneurysm of Abdominal Aorta. *Am. J. Surg.* 97:270.
- Estes, Jr., J. E. (1950). Abdominal Aortic Aneurysm. *Circulation* 2:258.
- Gliedman, M. E., Ayers, W. B., Vestal, B. L. (1957). Aneurysms of the Abdominal Aorta and Its Branches. *Ann. Surg.* 146:207.
- Hunt, H. H. and Weller, C. V. (1946). The Syndrome of Abdominal Aortic Aneurysm Rupturing into The Gastro-intestinal Tract. *Am. Heart J.* 32:571.
- Javid, H., Dye, W. S., Grove, W. J., Julian, O. C. (1955). Resection of Ruptured Aneurysms of the Abdominal Aorta. *Ann. Surg.* 142:613.
- Kampmeier, R. H. (1936). Aneurysm of the Abdominal Aorta: a study of 73 cases. *Am. J. Med. Sc.* 192:97.
- Kubota, N. and Moragues, V. (1959). Ruptured Abdominal Aortic Aneurysm with Massive Gastro-intestinal Haemorrhage. *Am. Heart J.* 58:547.
- Rottino, A. (1943). Aneurysm of the Abdominal Aorta with Rupture into the Duodenum. *Am. Heart J.* 25:826.
- Savage, C. R. and Harris, J. D. (1960). Ruptured Abdominal Aortic Aneurysms. *Lancet* 2:466.
- Scott, V. (1944). Abdominal Aneurysms: a report of 96 cases. *Am. J. Syph. Gonorr. & Ven. Dis.* 28:682.
- Voyles, W. R. and Moretz, W. H. (1958). Rupture of Aortic Aneurysm into Gastro-intestinal Tract. *Surgery:* 43:666.