MEDICAL MEMORANDA

Control of Aortic Haemorrhage by Balloon Catheter

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Haemorrhage from the majority of leaking aneurysms of the abdominal aorta can be controlled by cross-clamping below the origin of the renal arteries. Nevertheless, occlusion of the aorta at a more proximal level may be necessary either when the aneurysm involves the renal vessels or when there is profuse bleeding from the posterior portion of the proximal anastomosis between graft and aorta. The use of conventional vascular clamps in these situations necessitates further dissection of the aorta behind the upper part of the lesser sac. An alternative yet little-known method makes use of the Foley-type catheter. The intraluminal inflation of the balloon of one of these catheters provides a simple, safe, and rapid way of occluding the proximal aorta, and we report here its successful use during aortic resection.

Case Report

The patient, a previously fit man of 53, was brought to the accident and emergency department of the Brook Hospital on 4 April 1971. He gave a history of three days of increasing abdominal pain that radiated through to the back. The pain had suddenly worsened on the morning of admission and he had lost consciousness. On examination he was severely shocked and a large tender aneurysm was easily palpable in the abdomen. At operation the sac was found to arise immediately below the renal arteries, to be thin-walled, and to have a large retroduodenal tear. A Satinsky vascular clamp was used to control the proximal end and a routine repair was performed with a bifurcated Dacron graft. On removal of the Satinsky clamp a small tear became apparent in the aorta at the level of the renal arteries. This was controlled by direct pressure while a size 30 F. Foley catheter was inserted between stay sutures through a stab incision in the graft and passed up into the thoracic aorta (see Fig.). Inflation of the balloon with 30 ml of saline produced immediate control of the haemorrhage and allowed further mobilization of the renal vein and suture of the tear. The catheter was then withdrawn and the defect in the graft side-clamped and repaired.

The postoperative phase was complicated by repeated episodes of hypotension, and the patient required positive-pressure ventilation and continuing transfusion for 36 hours. At no time was any deterioration in renal function apparent. Four days postoperatively he passed three melaena stools and became hypotensive again. Oesophagogastrosocopy at this time showed several gastric erosions, all bleeding slightly, as well as an inactive duodenal ulcer. A further transfusion was given but the haemorrhage persisted, and laparotomy was performed next day. Gastrotomy disclosed the presence of 10 acute gastric erosions, most of these being in the pyloric canal and the largest measuring 2 by 1 cm. A two-thirds Polya gastrectomy was therefore performed. The patient made a rapid recovery from this and was discharged to convalescence on 24 April. He has since remained well.

Comment

Balloon catheters were first used for the control of major aortic haemorrhage in battle casualties of the Korean war (Hughes, 1954). The first case in which the technique was used during the resection of an abdominal aneurysm was reported in 1962 by Hesse and Kletschka, who inserted a size 20 F. Foley catheter on an introducer through an incision in the graft. These authors had previously found that cadaveric aortas were not damaged by this procedure even when the balloons were inflated with as much as 100 ml of fluid.

Balloon catheter inflated to occlude aorta proximal to the level of the renal arteries.

Recently Robicsek *et al.* (1970) reported 24 cases in which intraluminal occlusion was used to control bleeding both where the upper end of an abdominal aneurysm involved the renal arteries and where the site of haemorrhage from the upper suture line was obscured by conventional cross-clamping.

In the present case the unusually thin aortic wall was punctured by cross-clamping, and the substitution of the Foley catheter technique removed the hazard of further damage at a more proximal level. The arrest of haemorrhage was rapid and complete, and though the catheter was inflated above the origin of the renal arteries the short period of ischaemia did not result in any obvious renal damage. The occurrence of acute gastric erosions is a well documented though rare complication of major operations, especially those requiring massive blood transfusion. Their aetiology is unknown, but in view of the absence of renal damage their presence in this case was probably not due to the catheter occlusion.

In summary, the Foley type of balloon catheter has two important applications in the surgery of the difficult aortic aneurysm. Firstly, it is a rapid and effective way of controlling haemorrhage at the start of the operation before the dissection of the neck of the sac is begun. Secondly, it allows a good exposure of the region of the proximal suture line should major bleeding occur after completion of the anastomosis.

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