INTRAAORTIC BALLOON OCCLUDER APPLICATION IN THE SURGERY OF JUXTARENAL AORTIC DISEASE

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Juxtarenal aortic atherosclerosis (JRAA) is defined as aneurysms or occlusive diseases that include the infrarenal abdominal aortic segment and extend up to and sometimes include the lower margins of the renal artery origins. Accurate diagnosis is diffucult and frequently it is recognized at the operation. Many vascular centers have reported many different operative techniques in JRAA. We have applied "Pruitt's" intraaortic balloon occluder in six electively choosen patients with JRAA. We believe that this technique should be considered valuable because of its ease at application, less requirement of aortic dissection and also autotransfusion.

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Juxtarenal aortic atherosclerosis is defined as an aneurysm or occlusive disease involving the infrarenal abdominal aortic segment which extends up to the level of renal artery orifices and in some instances includes their origins. In such conditions, aorta must be controlled suprarenally for either avoiding residuel lesions or preventing early recurrence. For achieving this goal many different methods are proposed, such as suprarenal aortic clamping, placing an aortic clamp at the level of hiatus aorticus at diaphragma, or using an aortic compression device[1-5].

Preoperatively in such cases it may be difficult to determine whether the involved aortic segment extends up to the level of renal artery orifices or not. Neither physical examination, nor ultrasonographic (US) and computerized tomographic (CT) studies provide accurate confirmation for this type of localizations. Biplane abdominal angiographic examination seems to provide the most accurate localization of the disease[1,2]. However, in many cases, the ultimate diagnosis could only be made during operation. Further, in many cases

whose preoperative conventional angiograms suggest the juxtarenal aortic disease, only the organized thrombi that is not adherent to the aortic wall is found when the aorta is opened at operation. In such cases thrombus can be taken out and the aortic clamp can easily be applied infrarenally. But in cases which the aortic disease extends up to the renal artery orifices it is not possible to procede with the proximal graft aortic anastomose with an infrarenally placed aortic clamp. Still controversies exist about the technique to be applied and there are still technical problems to be overcomed exist in such operations. Here, we present the results of an easy, effective, time-sparing method "application of intraaortic balloon occluder" to control the suprarenal aortic bleeding without any additional aortic dissection.

Material and Method

Between January 1989 and July 1990, 43 patients underwent abdominal aortic operations for either aneurysmal or occlusive aortic disease. In six of these cases (13.9%), lesions were localized at juxtarenal position. All cases were male with a mean age of 65, ranging between 58 and 72. In all cases, atherosclerosis was the etiological cause presenting aneurysmal form in 3 cases and occlusive form in the other 3 cases. Hypertension in 3 patients, chronic obstructive lung disease in 2 patients and grade I aortic insufficiency in one patient were the associated diseases in this group. Left ventriculography and coronary angiography were performed for all cases and revealed no lesion of any importance.

Serum creatinine levels were higher than 2 mg/dl in 3 patients. Two of them responded well to hydration and forced diuresis and their creatinine levels decreased to normal. But one

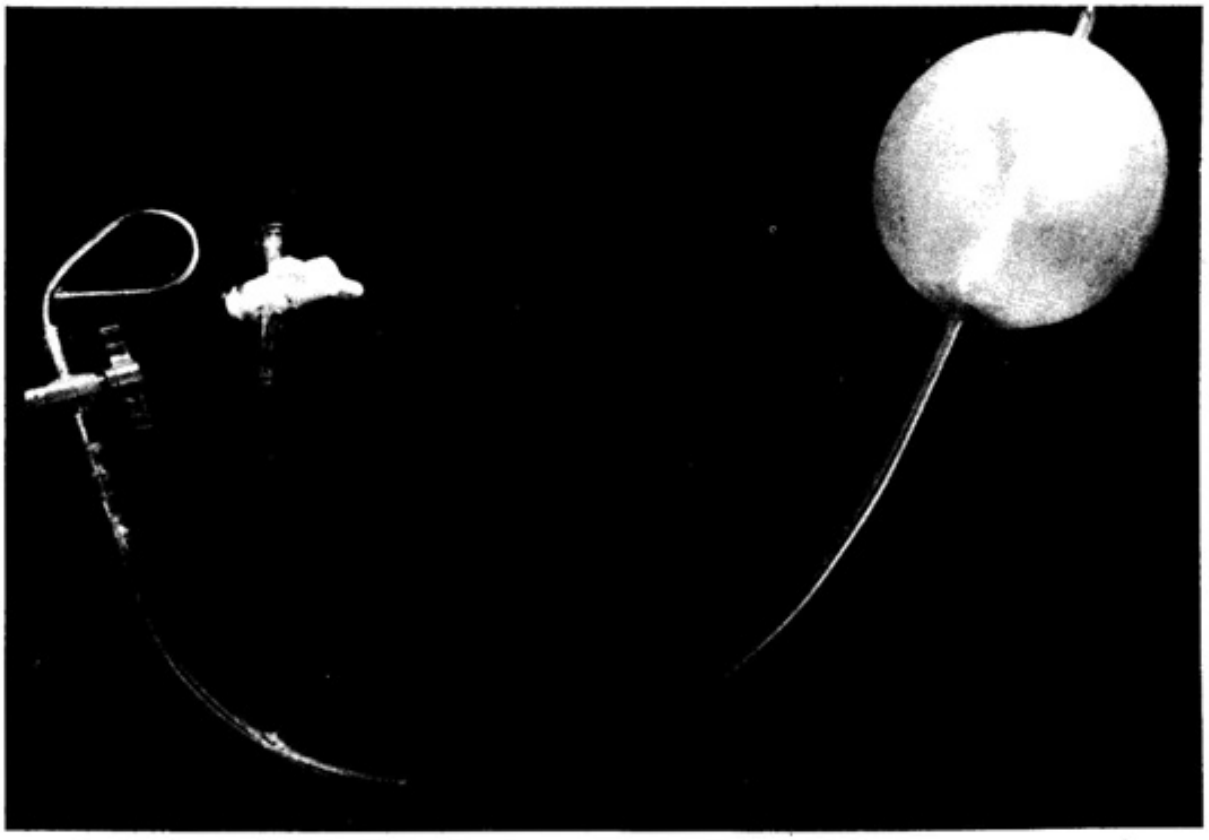

Fig.1. "Pruitt's" intra aortic balloon occluder

patient needed hemodialysis before the operation.

Among the patients with aortic occlusion, one patient was suffering from rest pain in legs and another had necrosis in his two toes. Three patients with aortic aneurysms were suffering from abdominal and back pain, one of them had necrosis in his toe. In patients with abdominal aortic aneurysms, the juxtarenal localization was not confirmed with US or CT and the diagnosis were made by cineangiographic studies which were performed during routine coronary angiographic examinations. In patients with occlusive disease, conventional angiographic studies showed that the aorta had been cut off just at the level which renal arteries originate.

In six patients with juxtarenal aortic disease, we used "Pruitt's" double-lumen 50F intraaortic balloon occluder electively. This occluder has two seperated lumens that are controlled by stopcocks one for inflating or deflating the occluding balloon and the other for taking blood samples from proximal aorta or drug administration such as heparin (Fig.1). Autotransfusion was not used in any of the cases.

Operational Procedure

All patients were monitorized for CVP through internal jugular vein, for arterial pressure via the transducer cannula in the radial artery and for ECG. Since the preoperative coronary angiocardiographic studies revealed no significant lesion, pulmonary artery pressure monitorizations by the Swan-Ganz catheters were not used.

Approach to the aorta was accomplished through standard transabdominal incision. Aorta was taped around just below the renal arteries. Aortic clamp applied temporarily in the infrarenal position and the aortic incision was made. In the cases with abdominal aortic aneurysms, back-flow from the iliac arteries was controlled with intraarterial balloon occluders. Under direct vision, the upper extension of the lesion was evaluated, if it seemed to continue above the aortic clamp, we inserted the 50F double-lumen "Pruitt's" occluder into the aorta passing through the limbs of the clamp while controlling aortic bleeding with digital compression. Then the balloon was inflated with 25-35 ml SF and the aortic clamp was released. Aortotomy was extended proximally to evaluate renal artery orifices and to reach to a healty vessel segment. Proximal anastomosis of the Dacron graft was done with 3/0 polypropylene continuous whip suture, paying extreme attention to avoid any interference with renal arteries and bites were taken just below this level. Before the suture was tied, the occluding, balloon was deflated and taken out of the aorta. Next steps of the operation were completed in the usual manner (Fig.2).

Results

Operation time ranged between 95-145 minutes. Mean operation time was 120 minutes. Renal ischemia period was ranging between 13 and 24 minutes with a mean of 18.5 minutes. We didn't meet any postoperative complication due to operational renal ischemia period. There wasn't any preoperatively detected renal artery lesion in this group. However, renal function disturbances due to aortic pathology existed preoperatively. In the postoperative period one patient had a hypertensive "stroke" followed by renal insufficiency and died on the 10th postoperative day. Renal functions returned to normal in the others.

In 4 cases, aorto-bifemoral, in one case aorto-biiliac bifurcated dacron grafts and in one case, a dacron tube graft were interposed. Excluding the case we lost with a cerebral stroke other cases were uneventful in their postoperative periods with normal creatinine levels. Late follow-ups were achieved for all patients for a postoperative period ranging between 2-10 months. Mean follow-up period was 6.8 months. They were all doing well with normal creatinine levels.

Discussion

Juxtarenal aortic disease is still a technical problem for vascular surgeons. Crawford reported that the first attempt to juxtarenal abdominal aortic aneurysm was accomplished by Denton Cooley in 1955[1]. In that operation

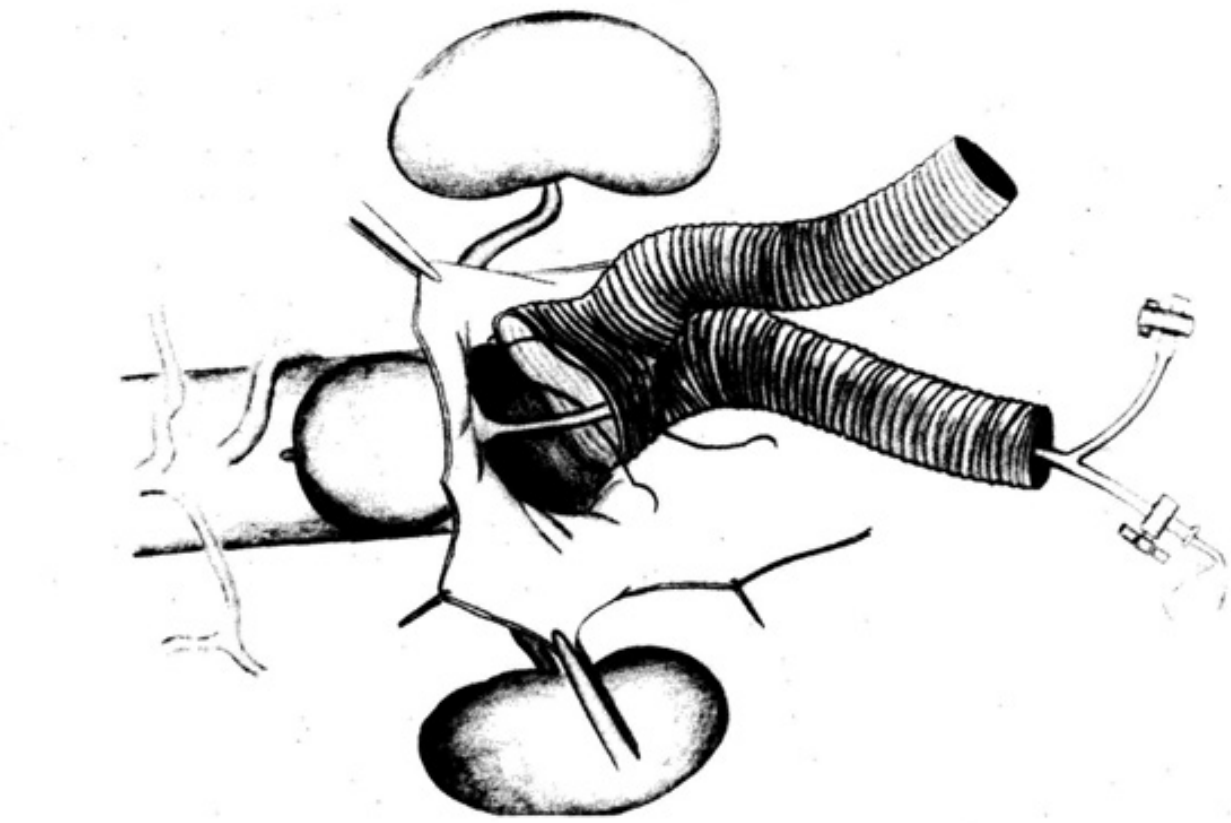

Fig.2. Application of "Pruitt's" intraaortic balloon occluder

Cooley had clamped the aorta at the level of arteria mesenterica superior. In his first attempts, Crawford was also using the same suprarenal clamping method in such cases. But later, he preferred to clamp the aorta at the level of diaphragma[1]. He also uses the autotransfusion methods against the bleeding from celiac axis and arteria mesenterica superior.

In his classical text, Crawford refers to WH Edwards that an aortic compression device at the hiatus aorticus to control the aorta completely in the ruptured aortic aneurysm cases can also be used[1].

It is also reported that balloon catheters are used to control the aorta in ruptured cases[6].

We conclude that, using the "Pruitt's" intraaortic balloon occluder is an easy, time sparing and effective method to control the bleeding from the proximal aorta in juxtarenal aortic diesase operations. It provides: Easy application, avoiding autotransfusion and additional aortic dissection and it facilitates the operational procedure.

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