Fistula salvage

For patients with renal failure renal replacement therapy, better known as dialysis is necessary. Without dialysis the body's waste products rapidly build up posing a risk of immediate death to the patient. The most critical of these usually is potassium which is abundant in a normal diet. If the potassium levels become too high this affects the heart and can cause it to stop. Dialysis can be achieved with continuous ambulatory peritoneal dialysis by which a tube is inserted into the abdomen through which fluid is put and allowed to stay for a while, during which time many of the waste products equalise with the fluid. This is then drawn out. Although this method is convenient, the main problem is of infection being introduced with the fluid. For the majority, haemodialysis is preferred, in which blood is filtered. This can either be done through a plastic tube introduced into a large vein. These lines can be either tunnelled under the skin or sticking directly through the skin. Tunnelling reduces the amount of infection but both cause blood to clot on the end of the plastic tube and irritate the vein next to the plastic tube. The preferred method of haemodialysis is by attaching an artery directly to a vein causing a large flow of blood through the vein which can then be punctured with needles in order for the blood to be filtered. This abnormal connection is a fistula.

The main problem with this is that following the surgery the veins can block up. Sometimes they block up within a few days or weeks, these fistulae are said to have failed to mature. Sometimes mature fistulas will block up. Very commonly this is because the vein close to the abnormal communication (fistula) will narrow sometimes enough to cause the flow to reduce in the vein, sometimes enough even for it to thrombose.

In a Centre where there are 300-400 patients dialysing, it would be expected for 240-320 of them to have haemodialysis through a fistula and in the order of 1 per week will block. If the fistula was useful for dialysis up to that point, restoring normal flow in that fistula would save the patient another operation and keep the other sites available for fistula formation available, increasing the time that suitable site for haemodialysis are available.

It is sometimes possible to unblock a fistula merely by dilating the blocked segment. If, however, there is a large amount of thrombus within the blocked fistula then doing this would result in quite a lot of thrombus going into the lungs causing pulmonary emboli. In the world literature there are very few accounts of this causing a serious outcome such as stroke or death, although, as it is likely to happen with simple dilation of the vein, it would seem reasonable to remove the thrombus before unblocking it.

The thrombus can be removed either by a surgeon who, through a small cut introduces a tube with a balloon on the end of it which is inflated once the tube is through the thrombus. It is then pulled back and the thrombus removed through the skin. There are now, however, endovascular ways of removing the thrombus through a pin hole puncture. This can be done with thrombus dissolving drugs known as thrombolytics. These generally are dribbled into the thrombus through a fine tube

over a period of hours. The thrombus then breaks down to a liquid which is less hazardous. Thrombolysis only works on fresh thrombus and has a risk of bleeding, with a small risk of stroke and death (about 1%). Mechanical devices can be used to remove the thrombus, some break the thrombus into tiny fragments others both break it up and aspirate it. The commonest of these is Angiojet and Aspirex. Angiojet is a tube with fine holes through which fluid is pumped at high pressure. This breaks the clot/thrombus up. It then sucks the broken up thrombus out through larger holes in the tube out of the vein into the machine. The disadvantage of this is it requires a large pump and a sucking device the expense of which is only reasonable if this procedure is done regularly. Aspirex is a tube with a hole in the side near the tip. Within the tube is a rapidly rotating helix/spring which causes suction, drawing clot into the window, the clot being macerated by the rotating spring.

Aspirex is a relatively new device and has been used for clotted arteries for a few years. Its use in blocked dialysis fistulae has not previously been described. Its success in both the short and medium term compares very favourably with the Angiojet device and both of these mechanical devices have the huge advantage that they can be done restoring patency within an hour, they do not require the patient to be admitted to hospital and dialysis can be performed immediately afterwards. Chemical thrombolysis may take two days during which the patient should be done using a high dependency hospital bed. The length of time often requires the patient to have alternative means of dialysis. Surgical embolectomy requires a surgeon and theatre space which are often of limited supply. Revision of a fistula is often required but again requires theatre space which may result in delay and therefore also requiring the siting of a temporary line. This may be the preferred option for hospitals with limited access to interventional radiology.

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