Hemodialysis Access Rupture

By Mohamed Sekkarie

How common is access rupture?
According to data reported to the Centers for Medicare & Medicaid Services, fatal rupture of arteriovenous (AV) dialysis access accounts for close to 0.4 percent of all hemodialysis deaths, which translates into about one death per 1000 hemodialysis patient years. A recent retrospective review of cases reported to the medical examiner in the District of Columbia, Maryland, and Virginia suggested that there is significant underreporting of such deaths (1). The incidence of nonfatal rupture is harder to estimate due to lack of data and no uniform definition of “rupture.”

Is any type of AV access more likely to rupture?
Gortex grafts are more likely to rupture than fistulae probably owing to higher risk of infection and lack of tunica media. Due to the higher prevalence of fistulae in the recent years, however, it is likely that rupture of fistulae as an absolute number may exceed that of grafts.

What is the difference between an aneurysm and a pseudoaneurysm?
Aneurysms are a bulging in the vein wall that has been weakened by repeated needle insertions. Pseudoaneurysms are a result of leaking blood, and have disrupted muscular layer.

What are the warning signs?
Possible signs of an impending rupture include the following: evidence of disruption of access wall; signs of infection; a persistent clot (scab): unhealthy skin; pseudoaneurysms that exceed twice the diameter of the graft or those that are increasing in size; and excessive access bleeding after dialysis, around needles, and between treatments (2). Close to 60 percent of patients who die due to a ruptured access experience an access complication event in the 6 months preceding death.

What is the role of access physical examination and when should it be performed?
Physical examination is best done before cannulating the access where tape and needles are not obstructing the view. One should look for the above signs. Nurses and patient care technicians should look for these signs at every dialysis session. The examination before dialysis should also be done by the nephrologist periodically.

What are the best preventive measures?
Primary prevention of rupture should concentrate on avoiding erosion of the access wall. In addition to measures to prevent infections, cannulation techniques are extremely important to prevent the formation of thin walled areas, including aneurysms and pseudoaneurysms. Rotating sites, including the rope ladder technique, make use of the whole length of the access and prevent wearing certain areas. Buttonhole technique in fistulae may have an advantage but good data are lacking. Cluster sticking, the tendency to stick in one general area, should be avoided (3). Lower risk of rupture is another reason why fistulae are preferred over grafts. Overtanicoculation should be avoided.

How urgent is the need for referral when these warning signs occur?
The presence of one or more of the above warning signs constitutes an urgent, and even at times emergent, situation (4). Direct verbal communications between the nephrologist and surgeon are critical. Active and recurrent bleedings and skin erosion require immediate surgical intervention.

What should the surgeon do?
Except in cases of infected grafts or uncontrollable bleeding, the surgeon should try to preserve the access by repairing the high risk area through aneurysmorrhaphy (Figs. 1 and 2) (5). Not all access surgeons are familiar this technique. In the case of graft pseudoaneurysms, endovascular repair with a stent is a good alternative (6).