Iatrogenic Renal Dissection during Renal Artery Stenting

Brian Funaki, M.D.¹

Renal artery angioplasty and stenting has become the initial treatment of choice for many patients with symptomatic atherosclerotic renal artery stenosis. Iatrogenic renal artery dissection is one of the most feared complications and usually occurs either at the time the lesion is crossed with a guidewire or during dilation.

CASE REPORT

A 67-year-old woman with hypertension refractory to medical therapy was referred for renal angioplasty. She had undergone right renal artery stenting 1 year earlier with good technical and clinical results.

The right femoral artery was catheterized and a 6 French (6-F) Balkan sheath was inserted over a guidewire. A pigtail catheter was advanced into the abdominal aorta and aortography was performed (Fig. 1A), revealing a widely patent right renal stent and an irregular left renal artery stenosis. Five thousand units of heparin was administered intra-arterially and the pigtail catheter was exchanged for a 5-F RC-1 catheter and 0.035-inch Bentson guidewire. The orifice of the left renal artery was catheterized and the guidewire and catheter were advanced across the lesion. A small amount of contrast material was injected, revealing a renal dissection (Fig. 1B). The catheter and wire were retracted into the aorta and an additional 3000 units of heparin was administered.

The RC-1 catheter and Bentson guidewire were exchanged for a VS-1 catheter and hydrophilic guidewire. After several minutes of manipulation, the lesion was able to be successfully recrossed with the catheter and guidewire. A hand injection of contrast material

demonstrated vasospasm of the intrarenal renal arteries (Fig. 1C). A 0.035-inch Rosen guidewire was positioned across the lesion and dissection in the distal main renal artery. The VS-1 catheter was exchanged for a 5-mm ultrathin angioplasty balloon catheter (Boston Scientific, Natick, MA). The lesion was dilated for ~1 minute in an attempt to both dilate the stenosis and tack down the dissection flap. An angiogram obtained through the 6-F guiding catheter revealed improved but suboptimal flow (Fig. 1D).

The angioplasty balloon catheter was exchanged for a premounted 5 mm × 20 mm balloon expandable stent. The lesion was stented with an excellent angiographic result (Fig. 1E). On follow-up, the stent has remained patent for the past 4 years.

DISCUSSION

Although any renal artery stenosis is susceptible to iatrogenic dissection, irregular atherosclerotic lesions are particularly prone to this complication. In this case, the tip of the catheter initially used to select the renal artery presumably became wedged into the irregular plaque. Even though a soft-tipped guidewire was then used to cross the lesion, as it emerged from the catheter tip, it “unroofed” the lesion, leading to a dissection. It is important to realize that when any guidewire, even those with an atraumatic soft tip, exits a catheter, it behaves like a trocar until enough of it is outside the catheter to fold on itself.

After this case, I stopped using “push” catheters (e.g., RC-1, RIM) during renal angioplasty and stenting procedures in favor short reverse curve or “pull” catheters (VS-1 or SOS Omni catheter). These catheters form in

Pharmacology in Interventional Radiology; Editors in Chief, Brian Funaki, M.D., Peter R. Mueller, M.D.; Guest Editor, Richard D. Shlansky-Goldberg, M.D. *Seminars in Interventional Radiology*, volume 22, number 2, 2005. Address for correspondence and reprint requests: Brian Funaki, M.D., Section of Vascular and Interventional Radiology, University of Chicago Hospitals, 5840 S. Maryland Avenue, MC 2026, Chicago, IL 60637. ¹Section of Vascular and Interventional Radiology, University of Chicago Hospitals, Chicago, Illinois. Copyright © 2005 by Thieme Medical Publishers, Inc., 333 Seventh Avenue, New York, NY 10001, USA. Tel: +1(212) 584-4662. 0739-9529;p;2005,22,02,141,143,ftx,en; sir00305x.

Figure 1 Iatrogenic renal artery dissection. (A) Initial aortogram shows irregular left renal artery stenosis and widely patent right renal stent. (B) Renal angiogram after iatrogenic dissection showing poor flow. (C) Renal angiogram after true lumen of dissection was recatheterized shows vasospasm of intrarenal renal arteries. (D) Renal angiogram after prolonged balloon angioplasty shows poor flow through patent left renal artery. (E) Renal angiogram after stent insertion shows good flow through artery and residual dissection flap immediately distal to the deployed stent.

the abdominal aorta or aortic arch. Instead of using the catheter to select the vessel of interest, a soft-tipped guidewire such as a Bentson is advanced ~1–2 cm out of the catheter and the catheter is advanced cephalad until the wire engages the vessel. The catheter is then pulled caudal and the reverse curve enables the catheter and wire to cross the lesion. The soft-tipped wire is

exchanged for a rigid wire such as a Rosen guidewire to complete the procedure. I generally use hydrophilic wires as a last resort because they may easily dissect plaques rather than remaining in the true lumen of the vessel.

Like any complication, iatrogenic dissections are best avoided whenever possible. When they occur, there is no consensus on the best strategy. All patients should

be liberally heparinized to limit branch vessel thrombosis. In some vessels such as the common iliac artery, if an occlusive dissection occurs, I usually attempt to approach the lesion from the opposite direction. This requires a second puncture in the contralateral femoral artery or sometimes the popliteal artery. This maneuver enables approach to the problem from the unaffected distal vessel and obviates the possibility of propagating the dissection further distally.

Attempting to cross the dissection from an antegrade direction is a difficult proposition and can lead to further propagation of the flap. On the other hand, if the artery is occluded by the dissection, there may be no other alternative, particularly if a vascular surgeon is not immediately available for bypass. I use a hydrophilic wire and gently probe the area of the flap. The single most

important aspect is probably luck. In my experience, when successful, the wire usually crosses easily into the distal vessel. It is important to realize that when the true lumen of the vessel is reentered, the reentry point may have occurred through the dissection flap and a stent is frequently necessary to tack down the flap completely.

An occlusive dissection may also occur after angioplasty. This is rarely a problem unless the flap spirals far distally (beyond the guidewire tip) because the guidewire used for the procedure remains in the true lumen of the vessel, facilitating repeated angioplasty or stenting, or both. Dissections created “against the flow” of blood are rarely problematic because blood flow tends to push the flap against the vessel instead of causing the flap to open and function like a windsock.