The Role of Stenting in Aortic, Renal, and Mesenteric Occlusions

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Percutaneous stenting can be an effective approach for the treatment of various types of occlusive arterial disease; however, appropriate patient selection is critical.

Kenneth Rosenfield, MD, Massachusetts General Hospital, Boston, Massachusetts, USA, discussed the role of renal intervention. Renal artery stenting (RAS) can be considered for appropriately selected patients. The CORAL trial [NCT00081731; Cooper CJ et al. AHA 2013 (abstr 19524)], STAR trial [NCT00150943], and ASTRAL trial [ISRCTN59586944] all had negative results with RAS; however, Dr. Rosenfield pointed out that these trials did not preselect the correct patient population. A pooled analysis of 5 prospective single-arm trials showed that both systolic and diastolic blood pressure significantly decreased following RAS (both $p < .0001$) [Weinberg I et al. *Catheter Cardiovasc Interv* 2014].

Patient selection for RAS involves a thorough evaluation of clinical indications, patient substrate, degree of stenosis, anatomic factors, available alternative therapies, and the expected benefits and risks of stenting. Dr. Rosenfield called angiographic RAS assessment the "weakest link" in renal stenting, as there is a lack of correlation with hemodynamic parameters [Subramanian R et al. *Catheter Cardiovasc Interv* 2005]. The use of fractional flow reserve in the renal arteries can accurately predict blood pressure improvement after RAS in patients with hypertension ($p = .0017$) [Mitchell JA et al. *Catheter Cardiovasc Interv* 2007; De Bruyne B et al. *J Am Coll Cardiol* 2006]. Dr. Rosenfield suggested that RAS may be appropriate in patients with resistant hypertension or ischemic neuropathy with chronic kidney disease, whereas patients with controlled blood pressure and normal renal function, end-stage renal disease, or renal artery with a chronic total occlusion are likely not appropriate candidates for RAS.

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A presentation from James P. Zidar, MD, Rex Healthcare, Raleigh, North Carolina, USA, discussed when to intervene in celiac artery and superior mesenteric artery (SMA) disease. Disease of the celiac artery and SMA is rare, but mesenteric ischemia can be life threatening and can lead to cachexia. Acute mesenteric ischemia is typically the result of obstructive thrombosis, frank embolism, or preexisting disease and causes symptoms such as leukocytosis and lactic acidosis. An abdominal dual-phase contrast computed tomography scan can identify a clot or a bowel ischemia or infarction, whereas angiography can be used for diagnostic and therapeutic purposes. Patients with SMA embolism often experience rapid clinical decline. Chronic mesenteric ischemia is frequently a result of arterial atherosclerosis and, in some cases, mesenteric venous obstruction, and it often causes symptoms such as food avoidance, weight loss, and ischemic gastropathy and colitis. A study of endovascular therapy of the SMA and celiac trunk with percutaneous transluminal angioplasty and stenting had a technical success rate of 95% and a clinical success rate of 61%; 67% of patients were without recurrent symptoms at 4 years [AbuRahma AF et al. *J Endovasc Ther* 2003]. In addition, survival rates were 93%, 80%, and 53% at 1, 3, and 4 years, respectively. Therefore, endovascular therapy of celiac artery and SMA disease can be offered as first-line therapy, and although recurrent stenosis occurs, it responds well to repeat dilation.

Michael S. Lee, MD, University of California at Los Angeles Medical Center, Los Angeles, California, USA, presented on the role of endovascular intervention in Leriche syndrome. Leriche syndrome is characterized by the atheromatous occlusion of the distal portion of the abdominal aorta at the bifurcation of the common iliac arteries. This syndrome typically affects male patients aged 30 to 40 years and causes symptoms such as leg weakness or numbness, claudication, erectile dysfunction, and a weak pulse in the femoral arteries. Known risk factors for the development of Leriche syndrome are cigarette smoking and hypercholesterolemia. As a result, chronic atherosclerosis, vasculitis, and thrombosis can occur. Surgical treatment of Leriche syndrome includes aortoiliac bypass graft or axillofemoral and femoral–femoral bypass. In a study

Table 1. Bypass Surgery Compared With Aortic Stenting in Aortoiliac Occlusive Disease

	Bypass Surgery (n = 118)	Aortic Stenting (n = 174)	p Value
30-day mortality	0.8	1.1	.64
Myocardial infarction	1.7	1.1	.53
Emergency surgery	6.8	1.7	.029
Infection/sepsis	16.1	2.3	< .001
Change in ABI			
Right	0.39	0.18	< .001
Left	0.41	0.15	< .001

ABI=ankle-brachial index (postrevascularization).

of > 2000 patients with aortoiliac disease who received successful aortoiliac stenting, the primary patency rate was 73% at 6 years, and assisted-primary patency and secondary primacy rates were 91% and 99% [Soga Y et al. *Circ J* 2012]. In addition, 77% of patients were alive at 6 years, and 72% had not experienced major adverse cardiovascular events. Researchers who compared bypass surgery to aortic stenting found that patients who underwent stenting experienced significantly less emergency surgery (p = .029) and infection or sepsis (p < .001; Table 1) [Burke CR et al. *Ann Vasc Surg* 2010].

Using a case study, Paul A. Jones, MD, Mercy Hospital and Medical Center, Chicago, Illinois, USA, discussed potential complications that can occur during aortoiliac intervention. The case involved a 74-year-old man with a history of tobacco abuse, chronic obstructive pulmonary disease, and systemic hypertension who had presented 19 months prior with left thigh and calf claudication. At the time, the patient refused conventional surgery. The patient presented again 18 months later with progressive, debilitating claudication, and after refusing conventional surgery again, he underwent percutaneous endovascular revascularization. Initially, brachial and common femoral access attempts were unsuccessful, and entry was gained with an ultrasound-guided reentry device. Predilation with a balloon (6 mm × 10 cm) was used to place 14- and 12-mm self-expanding stents in the left common and external iliac arteries, respectively. Yet, reflow was not achieved in the aortoiliac artery. Bolus eptifibatide was administered, and left brachial artery access was used to performed a percutaneous thrombectomy. However, the right iliac artery ruptured, and the patient was hemodynamically stabilized with a balloon occlusion and intravenous vasopressors. Aortic occlusion balloon was placed on standby, as were the surgeon and operating room. The rupture was successfully sealed with deployment of a self-expanding stent graft (13 mm × 5 cm). However, the patient experienced numerous severe complications 24 to 72 hours after the procedure, including bilateral blue toe syndrome, acute rhabdomyolysis, acute visceral ischemia, lactic acidemia, and thrombocytopenia, as well as a loss of distal pulses that prompted a left below-the-knee amputation. After a conservative approach of supportive care—including administration of acetylsalicylic acid, clopidogrel, and cilostazol with high-dose statins and aggressive local wound care—the patient was discharged after 3 weeks.

When considering percutaneous revascularization of aortic, renal, or mesenteric occlusive arterial disease, providers should carefully select patients and be prepared for potential serious complications during and after endovascular procedures.