

Hypogastric Interruption during Endovascular Aneurysm Repair Is Relatively Safe with Iliac Aneurysms: When Is It Not and When Should Revascularization Be Attempted?

NOTES

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Iliac artery aneurysms can be found in as many as 20% of patients with abdominal aortic aneurysms (AAAs).¹ Many patients with AAAs have bilateral common iliac arteries that are aneurysmal. In some instances, interruption of both hypogastric arteries in conjunction with aortoiliac or aortofemoral bypass is necessary to completely exclude the aneurysm. Historically, bilateral hypogastric artery interruption during standard open aortic aneurysm repair has been associated with considerable morbidity, including buttock necrosis, severe lower extremity neurologic deficits, ischemic colitis, impotence, and buttock claudication.^{2,4} More recent series of bilateral hypogastric artery interruption, particularly during endovascular aneurysm repair (EVAR), have indicated more favorable outcomes.⁵⁻¹¹ However, this issue remains controversial, with occasional reports of significant pelvic ischemia after bilateral hypogastric artery interruption.^{12,13} We analyzed our experience to identify factors that may help minimize pelvic ischemic complications with bilateral hypogastric artery interruption.

Methods

From 1995 to 2005, 62 patients with aortoiliac aneurysms required interruption of both hypogastric arteries as part of endovascular (n = 46) or open surgical (n = 16) repair. During endovascular aneurysm repair, coils were placed at the origin of the hypogastric arteries and bilateral hypogastric artery interruptions were staged at 1 to 2 weeks when possible. Open surgery necessitated oversewing or excluding the origins of the hypogastric arteries and extending the prosthetic graft to the external iliac or femoral artery. Collateral branches from the external iliac and femoral arteries were preserved, and patients received systemic heparinization (50 units/kg).

EVAR was performed with a variety of commercial grafts (AneuRx, Excluder, Ancure, Talent, Vanguard, Zenith) and surgeon-made grafts. Depending on the diameter and length of the hypogastric artery main trunk, coils ranging from 5 to 15 mm were used to exclude flow to the hypogastric arteries. Except for instances of unplanned bilateral hypogastric artery interruption (10 of 46 EVAR; 22%), most procedures (36 of 46 EVAR; 78%) were staged 1 to 2 weeks apart to potentially facilitate the development of collateral vessels. Patients who underwent staged procedures initially had coil embolization of one hypogastric artery and subsequent EVAR with coil embolization of the second hypogastric artery. The proximal and distal stent graft fixation sites were the infrarenal aortic neck and the external iliac artery or the common femoral artery, respectively. During dissections of the external iliac artery and femoral artery, the medial and lateral iliac and femoral circumflex collateral vessels were preserved.

Results

Over the decade, approximately 2,900 patients underwent open surgical repair (n = 1,665; 57%) or EVAR (n = 1,235; 43%). During the same period, 62 patients underwent bilateral hypogastric artery interruption as part of endovascular repair (n = 46) or open repair (n = 16) of aortoiliac aneurysms. The average patient age was 78.2 years. Comorbid conditions included coronary artery disease (n = 39; 63%), hypertension (n = 35; 56%), and severe chronic obstructive pulmonary disease (n = 9; 15%). Mean diameter of aortic, common iliac artery, and hypogastric artery aneurysms was 5.9, 4.2, and 4.5 cm, respectively. Complications of bilateral hypogastric artery interruption are outlined in Table 1.

Discussion

Although unilateral hypogastric artery interruption in treating aortoiliac aneurysm is considered the standard of care, the utility of bilateral hypogastric artery interruption remains controversial. Historically, several reports have suggested avoiding acute occlusion of both hypogastric arteries because of an increased incidence of pelvic ischemic complications and death.^{13,14} We generally agree with this principle. However, hypogastric artery preservation may sometimes be difficult, impossible, or dangerous in patients with complex aortoiliac aneurysms extending up to the iliac bifurcation or involving the hypogastric arteries. Our results suggest that in treating complex aortoiliac aneurysms, the morbidity of pelvic ischemia can be limited if the hypogastric arteries are interrupted at their origin, distal embolization is avoided, collateral branches of the external iliac and femoral arteries are preserved, and bilateral hypogastric artery interruptions are staged 1 to 2 weeks apart. Pelvic blood flow should be preserved whenever possible, particularly in patients who have had previous pelvic procedures that might have interrupted hypogastric artery collateral vessels, sustained hypotension, and possible distal pelvic embolization. We attempt to save one or both hypogastric arteries and have even reimplanted the hypogastric artery into the external iliac artery or performed endovascular external iliac to internal iliac artery bypass. However, we have found this to be a cumbersome procedure, particularly in patients who are obese or have calcified iliac arteries. A recent report by Lee and colleagues, comparing outcomes of adjunctive retroperitoneal iliac procedures with standard bilateral femoral exposures during EVAR, identified a marked increase in morbidity with the iliac artery procedures. On average, the retroperitoneal procedures were associated with a 2.6-fold greater blood loss, an 82% longer procedure time, 1.5 days of additional hospital stay, and a 1.8-fold higher rate of perioperative complications, including cardiac events (9%), respiratory failure (6%), ischemic colitis (6%), and buttock

claudication (16%).¹⁴ Other adjunctive procedures, including placement of larger “aortic cuffs” or flared iliac limbs to accommodate ectatic iliac arteries, are beneficial in preserving pelvic blood flow. However, their use is somewhat limited to ectatic iliac arteries less than 2.5 cm in maximum diameter. Our results suggest that bilateral hypogastric artery interruption is relatively safe in patients with complex aortoiliac aneurysms, particularly when pelvic collateral circulation from the external iliac and femoral arteries is preserved.

Table 1. Complications of Bilateral Hypogastric Artery Interruption

Endo-OpenAll _vascularSurgical	
Patients_Complication	(n = 46)
(n = 16)	(N = 62)
Buttock necrosis	0
00	
Ischemic colitis	0
00	
Neurologic deficit	0
00	
Buttock claudication*	7 (15%)
2 (13%)	9 (15%)
New-onset impotence	3/26 (12%)
2/10 (20%)	5/46 (11%)

*Buttock claudication developed in the immediate post-operative period in 28 of 62 patients (45%) with bilateral hypogastric artery interruption, but only 9 of 62 patients (15%) complained of buttock claudication at > 6-month follow-up.

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