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Natural History of Penetrating Atherosclerotic Ulcers

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Objectives: Increased utilization of computed tomography angiography (CTA) has increased the radiologic diagnosis of penetrating atherosclerotic ulcers (PAUs), which are defined as the ulceration of atherosclerotic plaque through the internal elastic lamina into the aortic media. However, their clinical relevance and indications for endovascular exclusion remain unclear.

Methods: The radiology database at a university hospital was searched for the CTA diagnosis of PAU from January 2003 to June 2009. All CTA scans were interpreted by a cardiovascular radiologist. Information on patient clinical characteristics and need for surgical repair due to PAU disease was also collected. PAU stability or progression was assessed by follow-up CTA, if available.

Results: A total of 395 PAUs in 315 patients were diagnosed by CTA interpretation (Table). There were 186 men (59.0%) and 129 women (41.0%), with a mean age of 73.3 ± 9.0 years. PAUs were located in the ascending aorta in 7 cases (1.8%), which were excluded from further analysis, the aortic arch in 27 (6.8%), the descending thoracic aorta in 243 (61.2%), and the abdominal aorta in 118 (29.7%). In 104 patients, there was an associated saccular aneurysm; in 48 there was an associated type B intramural hematoma; and the PAU in 163 patients was uncomplicated. Of the 163 patients with uncomplicated PAUs, 39 had follow-up CTAs: 31 (79.5%) demonstrated stable size over a mean follow-up of 17.3 ± 13.4 months, and 8 (20.5%) showed increased size over 12.3 ± 11.4 months. Fifty (15.9%) patients required thoracic endovascular aneurysm repair (n = 31), endovascular aneurysm repair (n = 10), or open repair (n = 9) for ruptured PAU or PAU-related aneurysm.

Conclusions: Interventions for PAUs are not infrequently necessary. Given a rate of progression of PAU disease as high as 20%, follow-up imaging is indicated in these patients.

Table.

Patients with uncomplicated PAU	*163*
Enlarged on serial CT	8/39 (20.5%)
Stable on serial CT	31/39 (79.5%)
Patients with PAU and (associated) saccular aneurysm	104
Requiring repair	34[a]
Patients with PAU and (associated) IMH	48
Patients with ruptured	16[a]

[a]Required open or endovascular repair

Adjunctive Endovascular Techniques in Management of Acute and Chronic Type B Thoracoabdominal Aortic Dissections: Implications of False Lumen Thrombosis, Pressurization, and Remodeling

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Objectives: We evaluated the impact of inducing false lumen (FL) thrombosis via coil embolization during repair of type B thoracoabdominal aortic (TAA) dissections.

Methods: Since 2007, 26 patients underwent treatment of type B TAA dissections for aneurysm formation (n = 18, 69%), unremitting pain (n = 11, 42%), or rupture (n = 6, 27%). All thoracic endovascular aneurysm repair (n = 21, 81%) and endovascular aneurysm repair (n = 6, 19%) patients underwent coverage of all fenestrations along the descending thoracic aorta or the infrarenal aorta/iliac arteries. During the procedures, transfemoral access was obtained into both true lumen and FL; the stent grafts were implanted in the true lumen, and a cardioMEMS Endosure wireless pressure sensor as well as coils were packed in the FL of the thoracic or abdominal aorta/iliac arteries. The ratio of "FL to systemic pressure" measurements were recorded at systolic, diastolic, mean, and pulse pressure index at the time of implantation, at 1 month and every 6 months thereafter, and computed tomography angiography (CTA) was obtained at similar intervals.

Results: Technical success was obtained in all procedures; completion arteriogram did not indicate contrast filling into the FL. Follow-up 6-month and 1-year CTA indicated several significant findings: marked FL thrombosis in 22 patients (85%), FL remodeling with >5-mm reduction in maximum diameter in 17 patients (65%), and none of the patients had an increase in FL maximum diameter. All systolic, diastolic, mean, and pulse pressure index ratios of "FL to systemic pressures" were significantly reduced in 23 patients (88%) at 6 months and 1 year. No patients developed spinal cord ischemia, there were no significant outcome differences in acute and chronic TAA dissections, and the 30-day mortality was 3.8%.

Conclusions: FL embolization during endovascular management of acute and chronic type B TAA dissections is safe and effective in reducing FL pressures and maximum diameter and can be a valuable alternative in management of high-risk TAA patients.

Thoracic Endovascular Aortic Aneurysm Repair With and Without Coverage of the Left Subclavian Artery in the 2005-2008 ACS NSQIP

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Objective: Thoracic stent grafts have been increasingly used to treat descending thoracic aortic aneurysms. In some instances, intentional coverage of the origin of the left subclavian artery (LSA) is necessary. Prior data have suggested that coverage of the LSA may increase the risk of stroke and that primary revascularization may decrease this risk. In this study we analyzed the outcomes of intentional coverage of the LSA during thoracic endovascular aortic aneurysm repair (TEVAR).

Methods: The 2005 to 2008 American College of Surgeons National Surgical Quality Improvement Program database was analyzed. Using *International Classification of Diseases*, 9th ed diagnosis codes, we selected all patients with a primary diagnosis of thoracic aortic aneurysm who underwent TEVAR with and without coverage of the LSA and/or LSA revascularization. Of the 352 patients identified, 120 included coverage of the LSA but 232 did not. Concomitant LSA revascularization procedures were performed in 10 of the 120 patients. Primary LSA revascularization procedures without TEVAR were performed in 68 patients. We compared demographics, comorbidities, and postoperative complications.

Results: The cohorts were similar in age, race, gender, and comorbidities. Thirty-day mortality was similar: 5.0% for patients with LSA coverage vs 3.9% for patients with a preserved LSA ($P = .68$). The rate of postoperative stroke was significantly higher in the group with LSA coverage (7.5% vs 2.6%; odds ratio, 3.6, 95% confidence interval, 1.1-10.9; $P = .03$). Two of the 10 patients with concomitant revascularization suffered a stroke. Patients with LSA coverage and no revascularization had a stroke rate of 6.4%. The stroke rate for staged LSA revascularization without concomitant TEVAR was 7.4%. LSA revascularization patients also had a higher incidence of unplanned reintubation (10% vs 5%).

Conclusions: TEVAR for descending thoracic aortic aneurysms involving the LSA is associated with a high stroke rate regardless of whether a LSA revascularization procedure is performed concomitantly, at a separate setting, or not at all. This should be factored into the decision making when performing TEVAR.

In Situ Laser Fenestration and Stenting during TEVAR: A New Approach to Subclavian Artery Revascularization

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Objectives: A significant need exists for a versatile and accessible method to revascularize aortic branches during thoracic endovascular aneurysm repair (TEVAR). We present six TEVARs with laser fenestration of the left subclavian artery (SCA) as an alternative to debranching.

Methods: TEVAR is completed using a combination of Medtronic, Talent, or Cook TX2 endografts. Through retrograde brachial access, a 0.018-inch wire, followed by a Spectranetics Turbo Elite 2.0- to 2.5-mm laser catheter is placed in the SCA ostium. With gentle laser-endograft contact pressure, 45 mJ/mm^2 at 25 pulses/s is applied to the endograft for 3 to 5 seconds to create a fenestration. The 0.018-inch wire is then advanced through the laser into the endograft lumen and exchanged for a 0.035-inch