CURRENT SURGICAL THERAPY

15th EDITION

JOHN L. CAMERON
MD, FACS, FRCS(Eng)(Hon), FRCS(Ed)(Hon), FRCSI (Hon)
The Alfred Blalock Distinguished Service Professor
Department of Surgery
Johns Hopkins University School of Medicine
Baltimore, Maryland

ANDREW M. CAMERON
MD, PhD, MBA, FACS
The William Stewart Halsted Professor of Surgery
Director, Department of Surgery
Johns Hopkins University School of Medicine
Baltimore, Maryland

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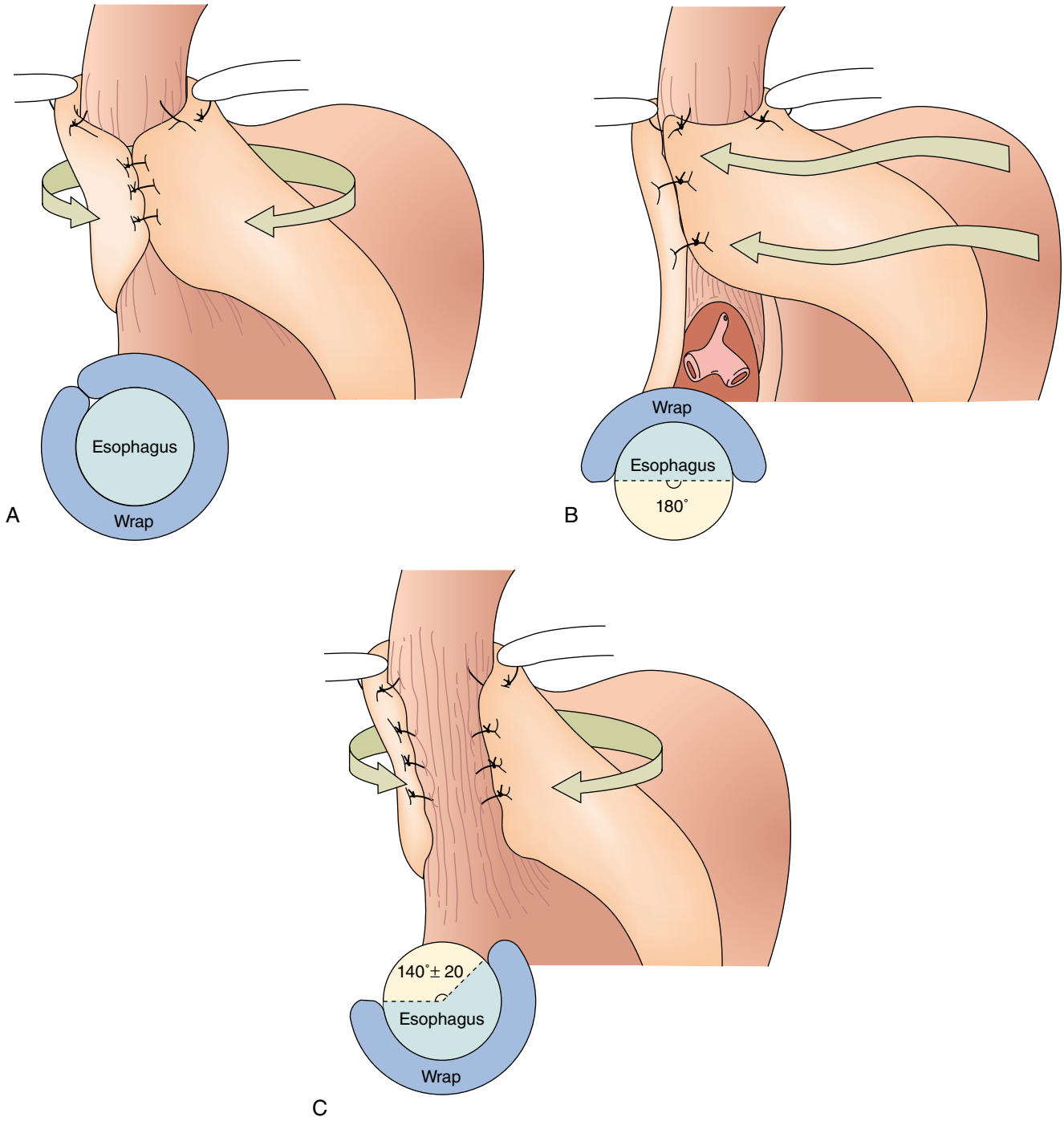

FIG. 2 The most common types of fundoplication. (A) 360-degree Nissen fundoplication. (B) 180-degree anterior Dor fundoplication. (C) 270-degree posterior Toupet fundoplication. *(From Yates RB, Oelschlager BK, Pelligrini CA. Gastroesophageal reflux disease and hiatal hernia. In: Townsend et al., eds.* Sabiston Textbook of Surgery. *20th ed. Elsevier; 2017:1043-1064.)*

ultrasonic of bipolar electrocautery device. Once the correct plane is identified, the left phrenoesophageal membrane is continually placed on stretch as it is divided, progressing anteriorly and sweeping tissue away from the membrane toward the esophagus to avoid injury to the anterior vagus nerve. Care is taken not to denude the peritoneum off the crus, as this can weaken the crural closure.

d. The dissecting instrument can then be used to create a retroesophageal window from the left side.

3. Exposing and opening the hiatus on the right side:
   a. The gastrohepatic ligament is divided starting at the pars flaccida and continuing cephalad toward the anterior aspect of the esophageal hiatus to expose the right crus. If a sizeable accessory or replaced left hepatic artery is encountered, this should be preserved.
   b. The retroperitoneal fat attached to the right crus above the left gastric artery can be retracted toward the patient's left to expose the right phrenoesophageal membrane. This should

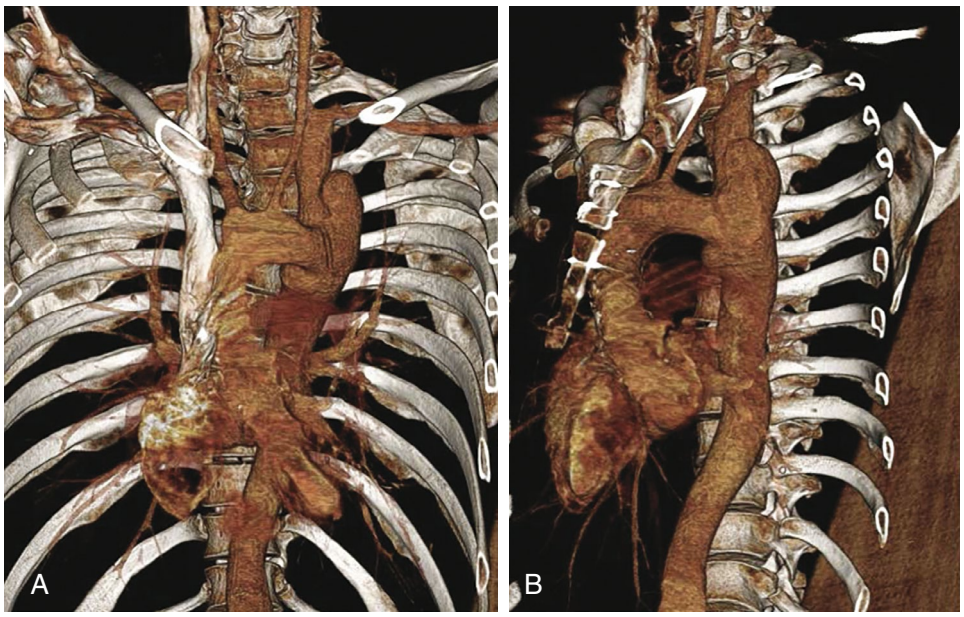

FIG. 3 3D reconstruction of computed tomography angiographic imaging of a patient with Loeys-Dietz syndrome and a large left subclavian artery aneurysm in coronal (A) and sagittal projections (B). *(Courtesy Dr. Matthew Sweet, Seattle, WA.)*

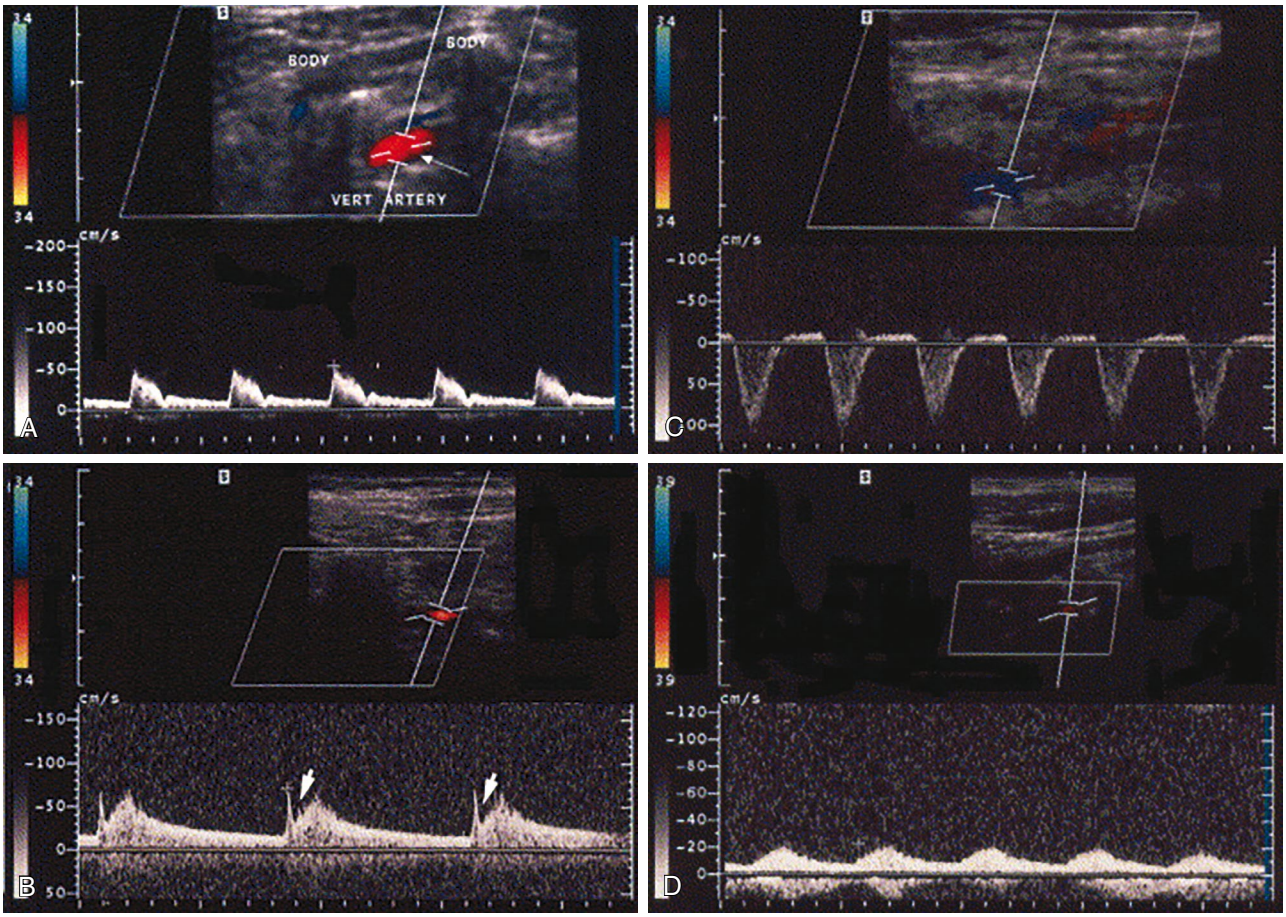

FIG. 4 Doppler waveforms typical of subclavian artery stenosis. (A) Normal antegrade vertebral waveform. (B) Latent subclavian steal demonstrating a presteal or "bunny" waveform characterized by an early to midsystolic dip in the Doppler waveform. (C) Retrograde systolic flow in the vertebral artery seen in hemodynamically significant subclavian stenosis. (D) Dampened Doppler waveform indicative of proximal obstruction within the ultrasounded artery. *(Adapted from Kalaria VG, Jacob S, Irwin W, et al. Duplex ultrasonography of vertebral and subclavian arteries. J Am Soc Echocardiogr. 2005;18(10):1107-1111.)*

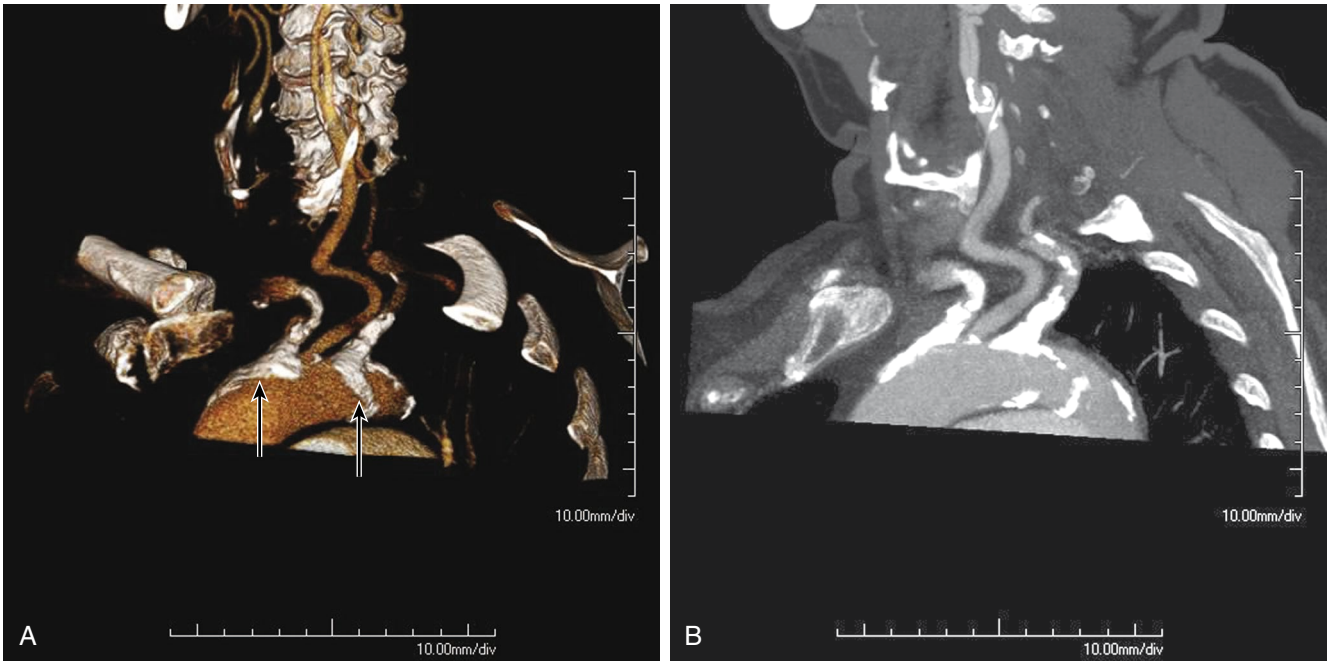

FIG. 5 (A) Computed tomographic (CT) 3D surface rendering of the aortic arch showing severe calcific disease of the origins of the innominate and left subclavian arteries *(arrows)*. (B) Maximum intensity projection images of the same patient reconstructed from the CT scan. *(From Cronenwett JL, Johnston KW. eds.* Rutherford's Vascular Surgery. *8th ed. Elsevier Saunders; 2014.)*

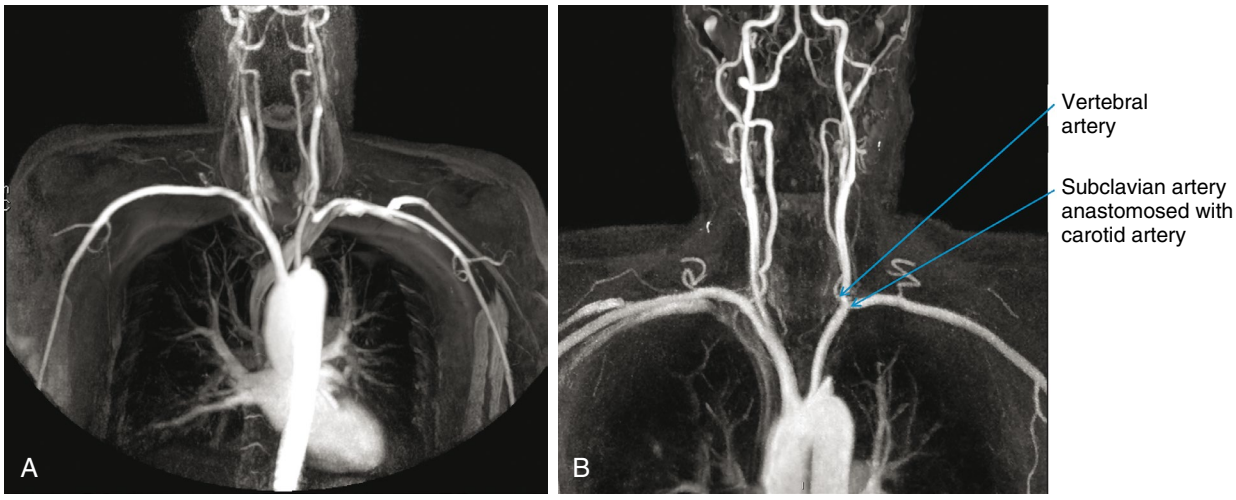

FIG. 6 Magnetic resonance angiography demonstrating occlusion of the proximal left subclavian artery (A), the pathology underlying subclavian steal syndrome; note the vertebral artery remains patent just distal to the occlusive lesion. (B) Status post revascularization with a carotid subclavian transposition procedure. *(Salman R, Hornsby J, Wright LJ, et al. Treatment of subclavian artery stenosis: a case series.* Int J Surg Case Rep. *2016:19:69-74.)*

The preferred threshold for brachiocephalic artery aneurysm repair is somewhat controversial. The rationale for intervention is to prevent aneurysm growth and subsequent rupture. Brownstein et al. examined 147 brachiocephalic aneurysms and observed an average growth rate of 0.04 cm/year, with 59% demonstrating no growth over 4 years of follow-up. There were no instances of aneurysm rupture during the follow-up period. Based on these data, the authors recommended a repair threshold of 3.0 cm for asymptomatic brachiocephalic aneurysms but noted overall they tended to have a benign course. It should be noted that brachiocephalic aneurysms associated with dissection or genetic aortopathy are associated with faster rates of growth and may warrant repair at a lower size threshold.

Intervention Options

Broadly, the treatment options for brachiocephalic disease can be categorized into two groups: open surgical reconstruction and endovascular intervention. Open surgical reconstruction is further divided into direct (anatomic) and indirect (extraanatomic) reconstruction. These approaches are not mutually exclusive, as some patients with complex disease will require a combination of techniques. The choice of approach is complex and related to a variety of factors including patient (age, history of prior sternotomy or mediastinal radiation, and comorbidities), anatomic (number of vessels involved, location and distribution of lesions, underlying pathogenesis, and symptoms at presentation), and surgeon (endovascular experience and skill).

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