Book Review

Carotid Artery Stenosis
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Carotid Artery Stenosis is a complete review of atherothrombotic disease at the bifurcation of the common carotid artery, its history, pathology, epidemiology, diagnosis, and management. The book naturally divides itself into 5 general areas that are not acknowledged by headings. The first area (chapters 1 through 3) deals with the history, epidemiology, and pathophysiology of atherothrombotic carotid disease. The second area (chapters 4 and 5) deals with the evaluation of atherothrombotic disease at the bifurcation of the common carotid artery. It includes computed tomographic angiography (CTA) and carotid duplex Doppler imaging with flow analysis. Magnetic resonance angiography (MRA) and conventional cerebral angiography are dealt with only in passing. There is no chapter dedicated to transcranial Doppler (TCD) assessment of the effects of pathology in the carotid artery on intracranial arterial flow. The third area (chapters 6 through 11) covers the various medical therapeutic options for preventing progression of atherothrombotic disease. The fourth area (chapters 12 through 16) discusses the rationale for the various surgical therapeutic options, including a welcomed chapter on extracranial and intracranial bypass grafting. The fifth area (chapters 17 through 20) covers the endovascular considerations for management of atherothrombotic carotid disease. An editor’s summary chapter at the end of the book would have been helpful in binding all of the chapters together to provide a practical guide for the practicing physician at the bedside. My reaction to these general areas and some individual chapters follows.

The first group of chapters deals with the introduction, epidemiology, pathology, and pathophysiology of carotid disease. The introductory chapter could serve as a summary chapter for the book, with the notation that it does not include suggested guidelines for management. Nonetheless, the 3 chapters are complete in what they describe. My personal disappointment centers on the fact that the original and unique contributions of Dr C. Miller Fisher to the understanding of the pathology of atherothrombotic carotid disease are not presented in terms of how his interpretation explains the pathophysiology of transient ischemic attacks and stroke. It began in the early 1950s and set the stage for carotid endarterectomy. It was developed through careful patient observation and pathological correlation and has stood the test of time. The pathologies he described at the bifurcation of the common carotid artery and of subsequent embolism include the formation of thrombus at the atherothrombotic site, with subsequent embolism, and occlusion with clot propagation and extension into the middle cerebral stem. His description of all of the extracranial-to-intracranial collateral pathways, the pial-pial collateralization pathways, and the variabilities of the circle of Willis are all important when considering carotid thrombosis, artery-to-artery embolism, and low flow, stroke, or TIA. Only then can the precise pathophysiological description of transient cerebral ischemia and infarction be practically understood in terms of therapeutic planning. It gives a clue as to why some patients can occlude asymptomatically, why others develop low-flow transient ischemic attacks, why still others develop stuttering stroke, and why yet others occlude asymptptomatically until the thrombus formed embolizes or propagates into the middle cerebral stem and gives rise to a devastating stroke. His treatise on carotid dissection, with Dr Robert Ojemann, in the early 1970s is also a unique contribution. Carotid dissection is omitted altogether from the book.

The second group of chapters (4 and 5) deals with imaging. These chapters mainly focus on CTA and carotid duplex Doppler imaging and flow analysis at the bifurcation of the common carotid artery. Conventional invasive cerebral angiography and MRA are mentioned only in passing. Conventional invasive cerebral angiography is now largely supplanted by CTA but is of historical interest and has certain practical applications in carotid disease when the CTA modality fails to divulge the pathophysiology. MRA is not as reliable in arterial imaging as CTA but is also of historical interest. Unfortunately, there is no section on TCD assessment of carotid disease. TCD assessment of intracranial flow in the major arteries at the base of the brain serves as a guide to the hemodynamic significance or severity of internal carotid artery stenosis. Through direct pathological examination of the intact endarterectomy specimen, 100% specific carotid duplex Doppler and TCD criteria have now been developed to detect a stenotic internal carotid origin lesion that is severe enough to cause a pressure drop across it, ie, 70% stenosis or 1.5-mm residual lumen diameter.1,2 This becomes important because it is the precise point where the rate of stroke increases significantly in patients with asymptomatic carotid stenosis.3,4 Some believe that this knowledge is critical when evaluating the safety and efficacy of prophylactic endarterectomy or carotid stenting in an individual patient or in clinical trials.

The third area (chapters 6 through 11) covers medical therapies for carotid disease. It is very complete. It welcomely includes the section on homocysteine metabolism, its relation to atherothrombotic disease, and its management. Chapter 11 looks into possible future therapies, specifically, angiogenics. Otherwise, the medical therapeutic options described in this group are all directed toward controlling the activity of the carotid atherothrombotic plaque, ie, trying to stop or prevent its progression. Here, hypertension, cholesterol, lipids, and homocysteine metabolism through diet, medication, vitamin intake, and exercise are the major risk areas considered. Each of the chapters covers the rationale for treatment in a complete manner. Suggested algorithms for planning the initiation and advancement of medications in hypertension and hyperlipidemia might be a helpful addition for the reader.

The fourth area (chapters 12 through 15) discusses the surgical aspects of carotid disease. Included are chapters on operative risk, endarterectomy indications for symptomatic and asymptomatic patients, and surgical controversies. The operative technique is not described, this being more appropriate in a surgical text. The chapters on operative risk and the risk/benefit of endarterectomy are particularly important. However, modeling of pooled data for data analysis is only as good as the data used. A single randomized trial wherein the methods, study design, and results in terms of loss to follow-up, etc, can be carefully reviewed are always superior. As with all clinical trials, the unique problem of the individual patient always bears primary consideration. For example, early surgery for patients with carotid disease and artery-to-artery embolic ischemic stroke in the ipsilateral middle cerebral artery territory may carry a higher risk for immediate postoperative hemorrhage when the infarct is in the territory of...
the lenticulostriate vessels, ie, those arising from the middle cerebral stem supplying the basal ganglion. Infarcts in the distal middle cerebral territories near the cortical surface are much less likely to give rise to perioperative hemorrhage. A patient with symptomatic disease that is not due to artery-to-artery embolus or clot propagation but instead is due to low flow because of a lack of adequate collateral circulation through the circle of Willis may be a more urgent surgical candidate. Those patients experience progressive expansion of the infarct over hours to a few days. They can be identified by TCD analysis of the spectral waveform of flow in the ipsilateral middle cerebral stem. The spectral waveform is slow in its systolic uptake, and there is a narrow pulse pressure. The chapter on extracranial and intracranial bypass grafting is also welcome, as there are still ongoing considerations for applying this procedure.

The fifth and final area (chapters 17 through 20) deals with endovascular techniques. It summarizes the studies existing to date for stenting of the internal carotid artery origin. Regrettably, in those studies, TCD assessment of intracranial flow in the middle, anterior, and posterior cerebral stems combined with carotid duplex Doppler was not considered. The efficacy of endovascular techniques compared with endarterectomy could be more reliably studied when those patients with 70% stenosis or greater are considered. To some clinicians, the combination of these Doppler techniques is far more specific in identifying severe, hemodynamically significant carotid lesions than MRA or even CTA. Conventional cerebral angiography in identifying such cases is generally not applied because of its risks.

Overall, the book is complete for what it covers. It can be recommended for practicing primary care physicians, neurologists, cardiologists, neurosurgeons, and vascular surgeons interested in the field.

Disclosures
Dr Kistler has served as an expert witness in medical legal cases.

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References
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