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Osborn AG, Diagnostic Cerebral Angiography.

Lippincott Williams & Wilkins, Philadelphia, PA: 1999.

AJNR Am J Neuroradiol 1999, 20 (9) 1767-1769

<http://www.ajnr.org/content/20/9/1767>

This information is current as
of April 19, 2024.

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After its publication in 1980 (1), the previous edition of this book, *Introduction to Cerebral Angiography*, quickly became the prime text for students of neuroangiography, including radiology residents, residents in allied fields, and fellows in neuroradiology. Since that time, cerebral angiography has become somewhat more focussed in its diagnostic scope, and is clearly relegated specifically to diseases of the blood vessels. In 1980, there were still a few remnants of angiographic uses showing vascular displacements as secondary signs of masses in the head. Since then, especially in the last few years, various alternative and noninvasive imaging techniques for angiography have been developed to attempt even to replace angiography while still demonstrating diseases of blood vessels.

The more classical catheter angiography approach in many locales has had to compete to maintain its place in clinical usage with the other less invasive techniques, rather than the other way around. In addition, somewhat in the other direction, as a real extension of the techniques of catheter angiography, endovascular therapeutic approaches have advanced by leaps and bounds, requiring a sufficient number of skilled neuroangiographers to continue to apply these treatments further and safely. In this context, this second edition of Dr. Osborn's new book is quite a different text than the first.

There is an integration to some degree of MR (MRA) and CT angiography (CTA) with classical angiography. For example, Figure 3-25 highlights dehiscence of the petrous carotid canal, with soft tissue entering into the middle ear. This is shown with confirmation as an anomalous course of the internal carotid artery, including by MRA. This is a book of "angiography" in the broad sense. It is about the blood vessels perfusing the head, and their diseases. It is not about a particular technique to show those blood vessels. Clearly, the value of this text is there for all students of neuroradiology, as before, with the first book, with applicability for the diseases involving arteries and veins of the head, regardless of the technique used today, next year, or in 5 years or more.

There is a varying degree of detail found in different chapters. For example, Chapter 13 on vascular malformations gives a fairly complete perspective of various categories and subcategories, including pathology, etiology, incidence, angiographic findings, atypical lesions, associated lesions, and differential diagnosis for up to two to three pages for each of more than a half dozen subsets. Contrast that with the section on aneurysms, a more common disease, where in a table of the general features of intracranial aneurysms, there is

an attempt to produce a cursory summary without the fine details. As an example, readers will learn from the table and text that the third cranial nerve is the most common neuropathy caused by aneurysms. It is, however, difficult to find in the text or tables that the posterior communicating aneurysm is the most common one to produce a third-nerve palsy, or that the cavernous carotid and the basilar-superior cerebellar aneurysms are the next most common types. The missing point is, with a third-nerve palsy, if you cannot find a posterior communicating aneurysm, check carefully for those other two sites, the cavernous carotid and the basilar-superior cerebellar. Will readers be able to figure that out from what is written here? They need to know about what is not written here! The angiographic part of the encyclopedia of neuroradiology, Newton and Potts (2), had four separate texts, totaling a much larger work than this one. It is not expected that this book could be complete in all details. Some readers, however, might be fooled to think that this is a complete description because sections such as the one about vascular malformations are so thorough.

There are a few irksome terms used in the text. One repeatedly seen is "venous varix," a redundant expression like "a dead corpse" or "wet rain." A varix is always a venous aneurysm, with the word "venous" already included. "Venous varix" probably has been made popular by prominent interventional neuroradiologists whose mother tongue is not English. There are a number of places where the division of separate chapter subjects leads to incomplete and conflicting information, unless one is extremely wary. It is necessary to piece together items from different chapters to get the whole story. For example, Chapter 12, on intracranial aneurysms, offers in the text the association of Marfan's Syndrome with extracranial fusiform aneurysms and intracranial aneurysms of saccular, fusiform, or dissecting types. An illustration is included of both extra- and intracranial aneurysms in Marfan's (Fig 12-5). Contrast that with the mention, in the text, on the same page as Figure 12-5, that fibromuscular dysplasia has an association with intracranial aneurysms. No mention is made of the much more common extracranial dissections associated with fibromuscular dysplasia. That information is found in a different chapter, Chapter 15, on onatheromatous vasculopathy. Will this be easy for new students on the subject to piece together?

Another topic that can lead to misunderstanding concerns dural arteriovenous fistulae. When first introduced in Chapter 13 on vascular malformations, this entity is called "dural arteriovenous shunt." It

is appropriately mentioned that many or most of these are acquired lesions and are not malformations. The more commonly used term, "dural arteriovenous fistula," is not mentioned in Chapter 13. On the other hand, the description in Chapter 19, on basic techniques of diagnostic neuroangiography, states that dural arteriovenous malformations and fistulae have been used interchangeably and are mostly considered fistulae. No mention is made in Chapter 19 of the term "dural shunt," as used in Chapter 13. Will all students understand from this that this is all the same entity? As a separate point, there is an illustration in Figure 17-8, Chapter 17 (regarding stroke), of an acquired dural arteriovenous fistula associated with major dural sinus thrombosis. This is thought to be a most common and likely etiology for most acquired dural fistulae. This common association is not mentioned in the other main sections on fistulae in both Chapter 13 or 19. It is not certain whether readers easily will be able to put all this together as one disease entity.

The classification of meningiomas as listed in Chapter 14 is: a) meningioma (benign), b) atypical meningioma, and c) anaplastic (malignant) meningioma, as currently used by neuropathologists. There are, however, recently reclassified extra-axial tumors not mentioned here that used to be classified with meningiomas. Neuroradiologists might identify hypervascular extra-axial tumors, looking very much like meningiomas by imaging criteria, that are now called hemangiopericytomas or hemangioblastomas of meningiomas, according to the new classifications. These used to be lumped with "angioplastic meningiomas" but have been revised out of the cell type of meningioma. There is no mention of this change in this chapter, even though these lesions are very hypervascular and will likely be called meningiomas by neuroimagers. Is this a section where the most up-to-date histologic categorization exclusively supercedes the imaging criteria? Should there not be mention of the other hypervascular extra-axial lesions, hemangiopericytomas or hemangioblastomas of meningiomas, so that there would be understanding as to where some of the old "angioplastic meningiomas" went? Maybe only the old-timers would notice.

There are quite a number of neat pointers in this book. The very simple correlation of a hypoplastic carotid with a small bony arterial canal in the petrous bone for the carotid, an excellent use of simple, non-contrast CT, is shown in Figure 3-11.

The variability of watersheds of the main cerebral arteries, adapted from van der Zwan (3), are highlighted in Chapters 6, 7, and 8. That work on the cerebral arterial distribution puts to rest the idea that all patients' cerebral arterial watersheds must match the idealized standards that most neuroradiologists, neurologists, and others incorrectly believe to be the truth. It is of great benefit that this text of cerebral angiography highlights the wide

variability of the reality rather than the ideal concept. Maybe neuroradiologists can begin to recognize infarctions lined up at the brain vertex parasagittally, for example, as infarctions in the region of the periphery of vascular distribution, just as easily explained as caused by peripheral emboli as the alternative "watershed infarction." The latter, as a singular diagnosis, can overconfidently suggest that hemodynamic insufficiency is the cause of infarction, because the lesion location seems to straddle an ideal watershed that may not be there for that patient. Mention is made of the International Study of Unruptured Intracranial Aneurysms (ISUIA), alerting readers to this study. Unfortunately, the publication of this book more or less coincided with the publication of the ISUIA results (4). Readers therefore have to go to the original publication (4) to find out. According to that study, that the risk of unruptured aneurysms is low; ie, for aneurysms of 1 cm diameter and less.

In Chapter 14, readers are treated to a well-explained compilation of the utility of cerebral angiography to show brain landmarks and barriers like the falx. This is a taste of the old-style cerebral angiography that is not really used any more, and so difficult for today's students to put together. This easy-flowing explanation can give an excellent overview for new neuroradiologists of this historical method of assessment for mass effects of the brain. This seems to be a good way to do so.

Overall, *Diagnostic Cerebral Angiography* 2nd Edition, already stands as the new text of neuroangiography. The reproduction of images is excellent, and the legends to the illustrations are generally easy to follow, (Figure 12-9-C has an arrow pointing to an overlapped loop of both vertebral arteries where an aneurysm may or may not be hidden). Titles to the legends would allow readers who only skim to know instantly what they are looking at (maybe that shouldn't be encouraged for a summary text!). The text and subjects cover all appropriate topics. The references are current, although brevity in references sometimes leads to referring to recent reports that refer to other works, rather than the original works. This is found in various clinical background information sections for different topics. This book needs to be recommended as a study text for all students of cerebral angiography, whether they be in radiology, neuroradiology, neurosurgery, neurology, and other related disciplines. There should be the warning that, for particular topics where very specific details are desired, there should be reference to other materials as well. It is presumed that this summary text, as such a start-off point, is exactly what Dr. Osborn has intended, and she is congratulated once again. We look forward in the near future to continued, substantive advancement overall in neuroradiology, especially in neurovascular imaging. For that reason, the 3rd Edition is also eagerly awaited in a few years.

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