

# THE NORMAL CEREBRAL ANGIOGRAM

By

ARTHUR ECKER, M.D., Ph.D. (Neurology)

*Surgical Neurologist*

*Syracuse, New York*

Recent developments in cerebral angiography (such as the simplification of percutaneous methods of puncturing the carotid and vertebral arteries and the employment of local anesthesia) place this valuable diagnostic help in the hands of not only the surgical neurologist but also the medical neurologist or the neuroradiologist. Accordingly this manual is written especially for specialists in these three categories. It will interest also those anatomists, physiologists, pathologists, ophthalmologists, pediatricians and geriatricians who are concerned with the blood vessels of the brain.

The methods described in this book are useful in the diagnosis of many organic intracranial disorders such as tumors, aneurisms, and hematomas. Cerebral angiography may be used as an elective measure or in an emergency; and, unlike ventriculography, it does not precipitate the need for intracranial surgery.

## *In One Volume*

### Part I TECHNIC

A detailed, straightforward, practical method of performing percutaneous cerebral angiography. Possible complications are thoroughly discussed. This part has been written primarily for beginners in cerebral angiography.

### Part II ANGIOGRAPHIC ANATOMY

An illustrated description of normal cerebral angiograms—both arteriograms and venograms in various projections in the living human being. Common artefacts are described. Knowledge of normal angiographic anatomy is a prerequisite to understanding angiograms of pathologic conditions. Indeed, this work is designed primarily to provide a background for the interpretation of abnormal cerebral angiograms.

### YOU HAVE NEVER SEEN REPRODUCTIONS LIKE THESE

The painstaking care of author, engraver, and printer are manifest in the reproduction of these cerebral angiograms.

147 clear illustrations 216 pages

## *Exclusive:* FOLLOWING TOPICS DISCUSSED IN THIS BOOK NOT PUBLISHED ELSEWHERE

- The choroid plexuses of the lateral ventricles
- A persistent embryonic olfactory artery including Heubner's artery
- The relationship of certain blood vessels to the free edge of the tentorium and their displacement downward in temporal pressure cones and upward in transient herniation of the cerebellum
- The determination on the lateral venogram of the presumed position of the pineal when this body is not calcified

- A method of surveying angiographically, after a single needle puncture, both internal carotid arteries and the basilar artery and their branches (of special value in cases of spontaneous subarachnoid hemorrhage or increased intracranial pressure without localizing signs)
- A common artefact which simulates spasm of major cerebral arteries
- Lateral displacement of the anterior end of the vein of Galen

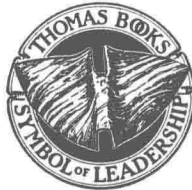
- Carotid arteriograms and venograms in a projection used to demonstrate the optic canal (of particular interest in cases of primary optic atrophy of unknown cause) which may be due to arteriosclerosis of the internal carotid, ophthalmic or anterior cerebral arteries
- A simple method of measuring mean intracarotid pressure
- Arteriographic indication of herniation of the cerebellar tonsils downward through the foramen magnum

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THE NORMAL  
CEREBRAL ANGIOGRAM

*To Three Inspiring Teachers*

JOHN HASTINGS, PH.D.: *Humanist*  
FREDERIC P. LORD, M.D.: *Anatomist*  
HENRY W. WOLTMAN, M.D.: *Neurologist*

## FOREWORD

CEREBRAL angiography is the demonstration of the blood vessels of the brain in x-ray films. It is useful in the diagnosis of many organic intracranial disorders such as tumors, aneurisms, and hematomas. Its importance is growing. It may be used as an elective measure or in an emergency, such as acutely increased intracranial pressure. Unlike ventriculography, it does not precipitate the need for intracranial surgery.

The most important recent improvements in cerebral angiography have been the simplification of percutaneous methods of puncturing the carotid and vertebral arteries and the employment of local anesthesia. These developments place cerebral angiography in the hands of not only the surgical neurologist but also the medical neurologist or the neuroradiologist. Accordingly, this manual is written especially for specialists in these three categories. However it will interest also those anatomists, physiologists, pathologists, ophthalmologists, pediatricians and geriatricians who are concerned with cerebral blood vessels.

This book consists of two parts: *I. Technic*—a detailed, straightforward, practical method of performing percutaneous cerebral angiography. Possible complications are thoroughly discussed. This part has been written primarily for beginners in cerebral angiography; and *II. Angiographic Anatomy*—an illustrated description of normal cerebral angiograms—both arteriograms and venograms in various projections in the living human being. Common artefacts are described. Knowledge of normal angiographic anatomy is a prerequisite to understanding angiograms of pathologic conditions. Indeed, this work is designed primarily to provide a background for the interpretation of abnormal cerebral angiograms.

Some of the topics published here for the first time may interest those with more angiographic experience. These topics include the demonstration of (1) the choroid plexuses of the lateral ventricles; (2) a persistent embryonic olfactory artery including Heub-

ner's artery; (3) the relationship of certain blood vessels to the free edge of the tentorium and their displacement downward in temporal pressure cones and upward in transtentorial herniation of the cerebellum; (4) a method of surveying angiographically, after a single needle puncture, both internal carotid arteries and the basilar artery and their branches (of special value in cases of spontaneous subarachnoid hemorrhage or increased intracranial pressure without localizing signs); (5) a common artefact which simulates spasm of major cerebral arteries; (6) lateral displacement of the anterior end of the vein of Galen; (7) the determination on the lateral venogram of the presumed position of the pineal when this body is not calcified; (8) carotid arteriograms and venograms in a projection used to demonstrate the optic canal (of particular interest in cases of primary optic atrophy of unknown cause) which may be due to arteriosclerosis of the internal carotid, ophthalmic or anterior cerebral arteries; (9) a simple method of measuring mean intracarotid pressure; and (10) arteriographic indication of herniation of the cerebellar tonsils downward through the foramen magnum.

A. F.

## ACKNOWLEDGMENTS

*I*T is a pleasure to record my debt of knowledge to the inventor of angiography, Egas Moniz. I have learned a great deal from the following physicians who are active in this field: Percival Bailey, Kristian Kristiansen, Carl List, Sidney Gross, David Cleveland, Wesley Gustafson, Wallace Hamby, J. M. Sanchez-Perez, James Poppen, Lester Mount and Oscar Sugar.

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The artist who has illustrated this book and who has been a fellow student of angiography is Lee Brown Coye. The medical photographers, whose conscientious work speaks for itself, are: Miss Stella Zimmer and Mr. Louis Georgianna.

Permission to use the following figures has been obtained from the respective authors and copyright owners: Fig. 30, Dr. Frank R. Ford and Charles C Thomas, Publisher; Fig. 31, Dr. Erich Fischer and J. A. Barth Press; Fig. 86, Dr. Henry Shenkin and the Archives of Neurology and Psychiatry.

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ARTHUR ECKER.



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## ABBREVIATIONS USED IN ILLUSTRATIONS

A <sub>1</sub> -A <sub>5</sub>	—Anterior cerebral artery
A CH A	—Anterior choroidal artery
A COM A	—Anterior communicating artery
A F A	—Ascending frontoparietal artery
A G A	—Artery of the angular gyrus (a portion of M <sub>4</sub> or M <sub>5</sub> )
AN	—Aneurism
A P A	—Anterior parietal artery
A T V	—Anterior terminal vein
B A	—Basilar artery
B V R	—Basal vein of Rosenthal
C <sub>1</sub> -C <sub>5</sub>	—Internal carotid artery (intracranial course)
CAL V	—Calcarine veins
CAV S	—Cavernous sinus
C M A	—Callosomarginal artery (a portion of A <sub>4</sub> or A <sub>5</sub> )
D T A	—Deep temporal artery
E C A	—External carotid artery
F P A	—Frontopolar artery
G C P	—Glomus of choroid plexus
I C V	—Internal cerebral vein
I J V	—Internal jugular vein
I M A	—Internal maxillary artery
I S S	—Inferior sagittal sinus
L	—Left
M <sub>1</sub> -M <sub>5</sub>	—Middle cerebral artery
M M A	—Middle meningeal artery
O A	—Ophthalmic artery
OCC A	—Occipital artery (an extracranial branch of the external carotid)
OCC S	—Occipital sinus
OCC V	—Occipital vein (an intracranial vessel draining the occipital lobe)
P AUR A	—Posterior auricular artery

P C A	—Posterior cerebral artery
P C H A	—Posterior choroidal artery
P C O M A	—Posterior communicating artery
P E R A	—Pericallosal artery (a portion of A <sub>4</sub> or A <sub>5</sub> )
P I C A	—Posterior inferior cerebellar artery
P O L A	—Primitive olfactory artery
P O V	—Parieto-occipital veins
P P A	—Posterior parietal artery (a portion of M <sub>4</sub> or M <sub>5</sub> )
P T A	—Posterior temporal artery (a portion of M <sub>4</sub> or M <sub>5</sub> )
P T V	—Posterior terminal vein
R	—Right
S C A	—Superior cerebellar artery
S C V	—Superior cerebral vein
S C L V	—Superior cerebellar vein
S M C V	—Superficial middle cerebral vein (superficial Sylvian vein)
S P S	—Superior petrosal sinus
S R	—Sinus rectus (straight sinus)
S S	—Sigmoid sinus
S S S	—Superior sagittal sinus
S T A (F or P)	—Superficial temporal artery (frontal or parietal branch)
S T R A	—Striate arterioles
S V	—Septal vein
T	—Tumor
T C V	—Transverse caudate vein
T H	—Torcular herophili
T S	—Transverse sinus
V A	—Vertebral artery
V G	—(Great cerebral) vein of Galen
V L	—(Small anastomotic) vein of Labbé
V T	—(Great anastomotic) vein of Trolard

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