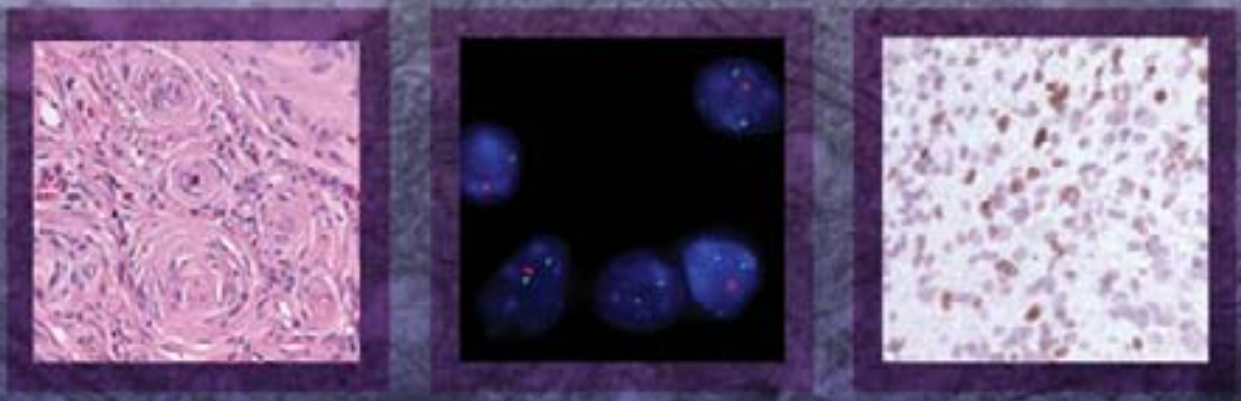
Series Editor: David E. Elder ■ Consultant Pathology 2

BRAIN TUMORS

Richard Prayson
Bette K. Kleinschmidt-DeMasters
Mark L. Cohen



demosMEDICAL

CONSULTANT PATHOLOGY

BRAIN TUMORS

Consultant Pathology Series

David E. Elder, MB, ChB
Series Editor

Tumorigenic Melanocytic Proliferations
David E. Elder

Brain Tumors
Richard Prayson, Bette Kleinschmidt-DeMasters, and Mark L. Cohen

Forthcoming Volumes in the Series

Thyroid Papillary Lesions
Virginia A. LiVolsi and Jennifer L. Hunt

Urinary Bladder Diagnosis
Robert O. Petersen

Head and Neck Pathology
Leon Barnes, Raja Seethala, and Simion Chiosea

Liver Pathology
Linda Ferrell and Sanjay Kakar

CONSULTANT PATHOLOGY

BRAIN TUMORS

Richard Prayson, MD
Section Head of Neuropathology
Cleveland Clinic Main Campus
Professor of Pathology
Lerner College of Medicine
Cleveland, Ohio

Bette K. Kleinschmidt-DeMasters, MD
Head of Neuropathology
University of Colorado
Professor of Pathology
University of Colorado School of Medicine
Denver, Colorado

Mark L. Cohen, MD
Director, Division of Neuropathology
University Hospital of Cleveland
Professor of Pathology
Case Western Reserve University School of Medicine
Cleveland, Ohio

demosMEDICAL

NEW YORK

Acquisitions Editor: Richard Winters

Cover Design: Joe Tenerelli

Compositor: Publication Services, Inc.

Printer: Sheridan Press

Visit our website at www.demosmedpub.com

Library of Congress Cataloging-in-Publication Data

Prayson, Richard A.
Brain tumors / Richard Prayson, Mark L. Cohen, Bette Kleinschmidt-DeMasters.
p. ; cm. — (Consultant pathology)
Includes bibliographical references and index.
ISBN 978-1-933864-69-3 (hardcover)
1. Brain — Tumors — Case studies. I. Cohen, Mark L., 1957- II. Kleinschmidt-DeMasters, Bette. III. Title. IV. Series: Consultant pathology.
[DNLM: 1. Brain Neoplasms — diagnosis — Case Reports. 2. Brain Neoplasms — pathology — Case Reports. WL 358 P921b 2010]
RC280.B7P725 2010
616.99'481 — dc22 2009040379

Made in the United States of America

09 10 11 12 13 5 4 3 2 1

To Beth, Brigid, and Nick for their unwavering support.

To my family—husband Bob, sons Tim and Tor, and daughter Julie—
without whom nothing in my career would have been possible.

To my parents, Beverly and Murray Cohen, without whom
my contribution would not have been possible.

To our patients, who have taught us so that
we may better help others.

This page intentionally left blank

Contents

This page intentionally left blank

Series Foreword

Diagnostic surgical pathology remains the gold standard for diagnosis of most tumors and many inflammatory conditions in most, if not all, organ systems. The power of the morphologic method is such that, in many instances, a glance at a thin section of tissue stained with two vegetable dyes is sufficient to determine with absolute certainty whether a patient should undergo a major procedure or not, or whether a patient is likely to live a healthy life or die of an inoperable tumor. In such cases, the diagnostic process is one of "gestalt," a form of almost instantaneous pattern recognition that is similar to the recognition of faces, different brands of automobiles, or breeds of dogs. In other "difficult" cases, the diagnosis is not so obvious. In many of these cases, a diagnosis may be possible, but may be outside of the experience of the routine practitioner. In such a circumstance, it may be possible for a practitioner with more experience—a consultant—to make a diagnosis rather readily. In other cases, the problem may really not be suited to the histologic method. In these cases as well, a consultant may be invaluable in determining that it is simply not possible to make a reliable diagnosis with the materials available. In yet other cases, the diagnosis may be ambiguous, and again a consultant's opinion can be important in establishing a differential diagnosis that may guide clinical investigation.

There are many fine consultants available to the practicing surgical pathology community. Many of them have authored textbooks, and many of them give presentations at national meetings. However, these materials can offer only a superficial insight into the vast amount of knowledge that is embedded in these individuals' cerebral cortices—and in their filing cabinets. This series represents an effort to enable the dissemination of this hitherto-inaccessible knowledge to the wider community. Our authors are individuals who have accumulated large collections of difficult cases and are willing to share their material and their knowledge. The cases are based on actual consultations, and the indications for the consultation, when available, are presented, because these are the records of the manner in which these cases presented themselves as being problematic. We have asked the consultants, when possible, to present their consultation letters in much the same form (albeit edited to some degree) as that in which they were first presented, because these represent the true records of the clinical encounter. In addition, we asked the authors to amplify upon these descriptions, with brief reference to the literature, and to richly illustrate the case reports with high-quality digital images. The images from the book, as well as additional images to amplify the presentation of the case, are available on a website for downloading, study, and use in education. These images, in some cases, have been derived from virtual slides, which also may be made available in the future from a digital repository for their additional educational value.

David E. Elder, MB, ChB, FRCPA
Professor of Pathology and Laboratory Medicine
Hospital of the University of Pennsylvania
Philadelphia, Pennsylvania

This page intentionally left blank

Preface

The practice of surgical neuropathology is challenging. In part, this is related to the relative lack of experience most pathologists have in this arena as compared with other areas of surgical pathology. Thus, a selection of neuropathology cases fits well into the Consultant Pathology series—a series of texts that will cover the spectrum of surgical pathology and will examine topics in a case-based format, similar to the real practice of pathology.

The focus of this text is on brain tumors. Examples of over 100 brain tumors, running the gamut from the very common to the rare, are presented in a case-based format. The cases were taken from our surgical neuropathology practices. We attempt to share with the reader our approaches and thought processes in evaluating the spectrum of central nervous system neoplasms. The wide variety of cases presented covers the entire scope of brain tumors and offers both an opportunity to review the basics for the beginner or relatively inexperienced pathologist, and a chance to see some of the rare entities. When relevant, current practical applications of immunohistochemistry and molecular pathology are discussed.

Each case is formatted as if it were a consult case and includes a brief clinical history, a description of the pathologic findings with numerous illustrations, the line diagnosis, a discussion of the entity and the diagnostic thought process, and a few pertinent references for further reading.

Our hope is that by sharing a bit of our experience, we can add to the reader's experience.

Richard Prayson, MD
Bette Kleinschmidt-DeMasters, MD
Mark Cohen, MD

This page intentionally left blank

Acknowledgments

Special thanks to Ms. Denise Egleton, who provided secretarial assistance for this project.

This page intentionally left blank

CONSULTANT PATHOLOGY

BRAIN TUMORS

This page intentionally left blank

Case 1: Normal Tissue

CLINICAL INFORMATION

The patient is a 28-year-old female who presents with headaches and complaints of dizziness. On imaging, subtle abnormalities are noted in the right cerebellar hemisphere. Because of persistent symptoms, a decision is made to biopsy the patient, and histologic sections are reviewed.

OPINION

Biopsies show normocellular cerebellar parenchyma. Because of the unusual orientation of the specimen, a grouping of small cells appears to be positioned in the middle of the gray matter.

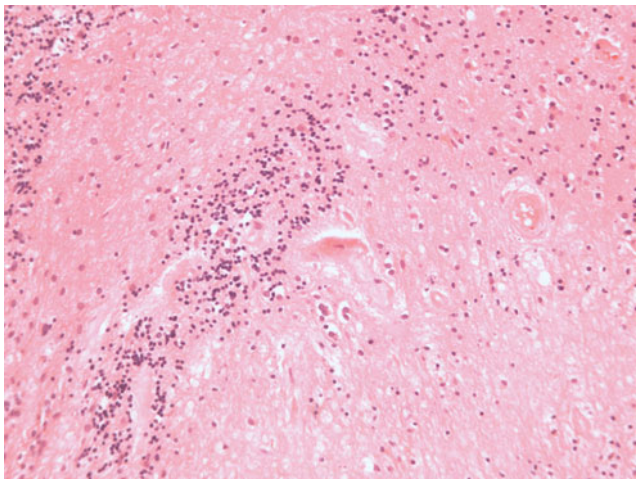


FIGURE 1.1 Section of cerebellum from this biopsy, showing a group of small, round cells from the granular cell layer, surrounded by molecular layer cortex. If one does not appreciate the unusual orientation of the section and the location of the biopsy, an erroneous diagnosis of chronic inflammation or encephalitis may be made.

We consider the biopsy as representing normal tissue and characterize it as follows: **Right Cerebellum, Biopsy—Cerebellar Tissue with No Significant Pathologic Changes**.

COMMENT

There is no definite evidence of neoplasm on the biopsy. There is no evidence of inflammation.

DISCUSSION

The usual target of a brain biopsy does not include normal tissue. Occasionally, however, the surgeon may not be on target, and the normal tissue may be inadvertently biopsied. In most instances, recognition of the tissue as normal is not problematic. On occasion, however, as a result of either the

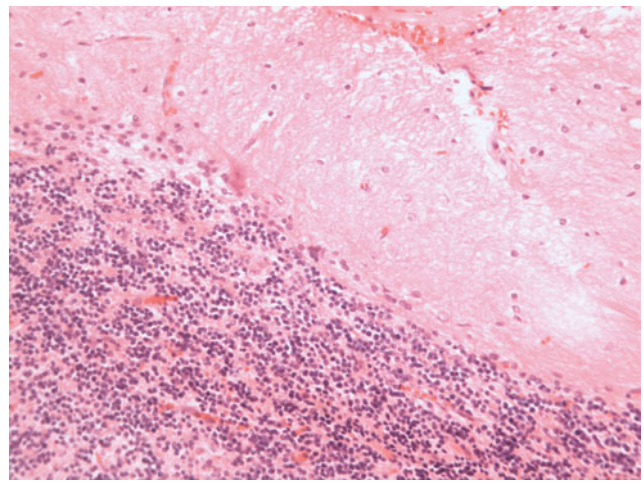


FIGURE 1.2 Normal, well-oriented cerebellum, showing the superficial molecular layer, Purkinje cell layer, and granular cell layer.

orientation of the specimen or lack of information regarding the location of the biopsy, normal tissue may mimic a tumor. This case illustrates one such example, in which failure to recognize the tissue as being from the cerebellum may result in a misinterpretation of the granular cells as lymphocytes; the result would be an erroneous diagnosis of chronic inflammation or encephalitis. Other circumstances in which normal tissue may be confused with a pathologic process include the following: (1) when one is unsure of the exact location of the biopsy, a biopsy from the pineal gland may be misinterpreted as representing either a pineal gland tumor, such as pineocytoma or a glioma; (2) a biopsy from the subependymal zone may be interpreted as a low-grade glioma; this region frequently is mildly hypercellular in the normal state; (3) a biopsy from the pituitary neurohypophysis may resemble a low-grade astrocytoma, such as pilocytic astrocytoma, or

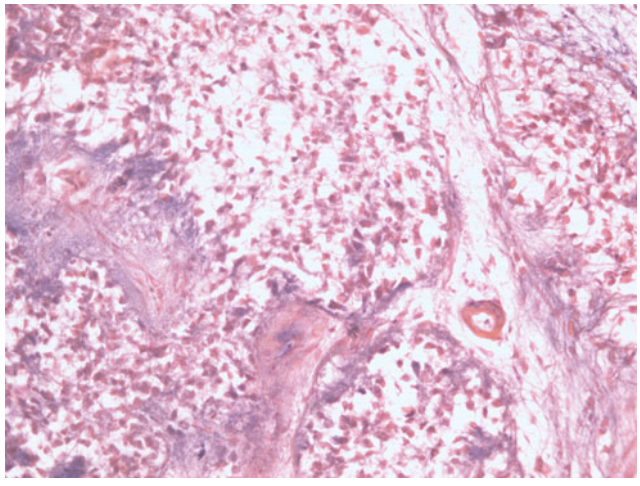


FIGURE 1.3 Normal pineal gland can mimic an anaplastic glioma.

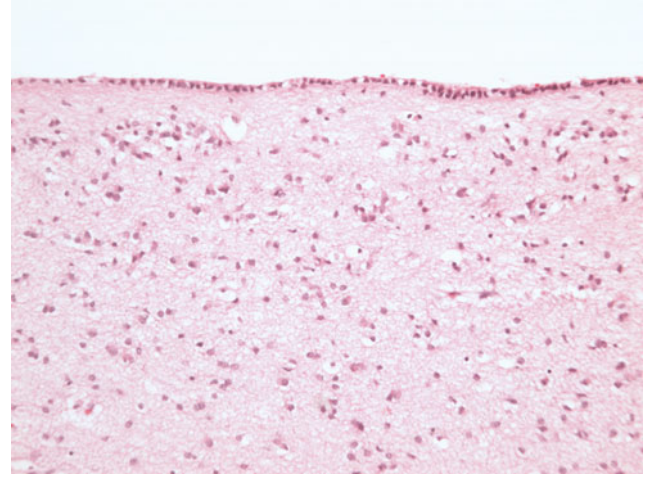


FIGURE 1.4 The subependymal zone may appear mildly hypercellular and cause confusion with a low-grade glioma.

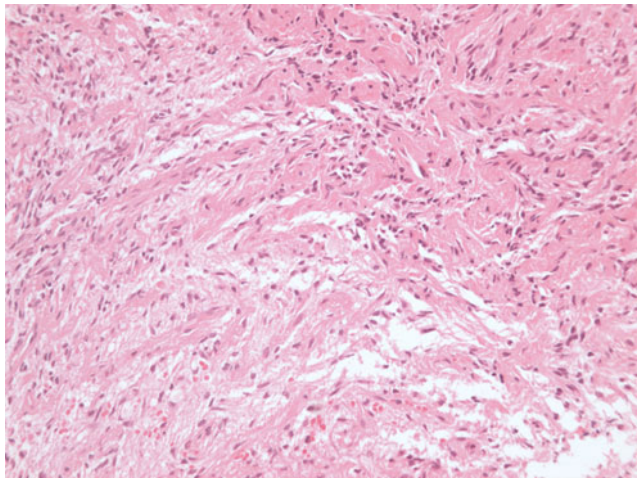


FIGURE 1.5 Pituitary neurohypophysis may resemble a low-grade astrocytoma or schwannoma.

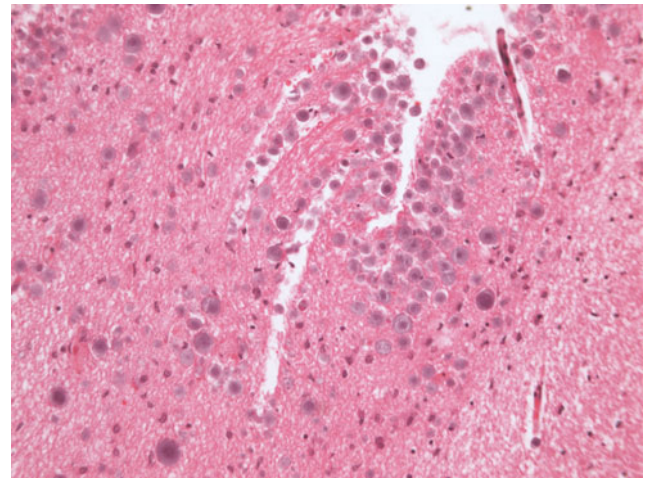


FIGURE 1.6 Corpora amylacea may resemble rounded cells at low magnification and can be confused with an oligodendroglioma.

a schwannoma; (4) the presence of numerous corpora amylacea (which may be a normal finding in a biopsy) can be misinterpreted as representing a low-grade tumor, particularly an oligodendroglioma, given the generally rounded nature of the corpora amylacea bodies.

To help avoid some of these confusions, communicating with the surgeon and knowing exactly where the biopsy is from are important.

References

1. Brat DJ. Overview of central nervous system anatomy and histology. In: Prayson RA, editor. Neuropathology. Philadelphia: Elsevier Churchill Livingstone; 2005. p. 1–36.
2. Kleinschmidt-DeMasters BK, Prayson RA. An algorithmic approach to the brain biopsy—Part 1. Arch Pathol Lab Med 2006;130:1630–8.