

A TEXT-BOOK OF X-RAY DIAGNOSIS

BY BRITISH AUTHORS

IN FOUR VOLUMES

THIRD EDITION

Edited by

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PREFACE TO THE THIRD EDITION

THE SCIENCE OF RADIOLOGY has made enormous advances since the last edition in 1950. These advances are partly due to new techniques and improved equipment but largely due to closer collaboration between colleagues in all branches of medicine. Radiology is now a clinical science in its own right. The tempo of new radiological observations and techniques is so rapid that a work on only an encyclopædic scale could cover it. It is not our intention, however, to cover every nuance and refinement of diagnostic radiology. These volumes were conceived as a text-book, to describe fundamental principles in interpretation and relate them to the day-to-day clinical problems of the average X-ray department. This necessitates the exclusion of some rare and much theoretical material, but we hope that nothing of major significance has been omitted and that this edition, like its predecessors, will reflect the best current practice of radiology.

The Editors deeply regret the death of Sir Hugh Cairns, one of our contributors in neurology in the last Edition. We welcome as new contributors Mr. D. W. C. Northfield, Dr. C. J. Hodson, Dr. D. Sutton, Dr. John D. Dow and Dr. P. G. Keates.

We are grateful to the block makers and printers and in particular to Mr. F. Boothby and Mr. J. Goodhall in the publishing house of H. K. Lewis and Co. Ltd., whose continuous interest and co-operation have contributed so much to the success of this text-book.

THE EDITORS

June 1957

PREFACE TO THE FIRST EDITION

THE OBJECT of the Editors in presenting this text-book is to provide within reasonable limits a comprehensive survey of the present position of X-ray diagnosis. Diagnostic radiology is becoming an increasingly complex speciality, and it is difficult for one person to be equally expert in all its branches. The Editors are fortunate therefore in having the help of collaborators, both radiological and clinical, who are distinguished in particular branches of the subject. It is hoped that this has made the work the more authoritative, and that it will be of value not only to the post-graduate student of radiology, but also to the clinician. In conformity with this design, only essential details of technique are included, and the subject of X-ray physics is not dealt with.

For convenience of reference, the work is published in three volumes, each containing as far as possible subjects of allied interest. Thus Vol. I deals mainly with the thorax, Vol. II with the abdomen, and Vol. III with the skeletal and nervous systems.

It is not possible, even within the generous limits allowed by the publishers, to illustrate every condition demonstrable by radiology, but the illustrations chosen are, it is hoped, representative, and give due emphasis to the common lesions met with in radiological practice. Considerable interchange of material for illustrations has taken place between the various contributors to the book, and the Editors are greatly indebted for the loan of illustrations from other colleagues, detailed acknowledgments of which will be found at the beginning of each volume. They are also grateful to Mr. Boutall, of Messrs. Vaus & Crampton, for the care and attention he has given to the preparation of the blocks, and to Messrs. Hazell, Watson & Viney for their careful work with the printing.

Finally, the Editors desire to express their sincere thanks to the publishers, and in particular Mr. H. L. Jackson and Mr. F. Boothby, for their co-operation and advice, without which this book could not have come into being.

October 1939

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THE EAR AND TEMPORAL BONE. SIR HAROLD GRAHAM-HODGSON.

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VOLUME I

PART ONE

CENTRAL NERVOUS SYSTEM

BY

M. H. JUPE, F.R.C.S., F.F.R., D.M.R.E.

AND

D. W. C. NORTHFIELD, M.S., F.R.C.S.

A TEXT-BOOK OF X-RAY DIAGNOSIS

PART ONE

CENTRAL NERVOUS SYSTEM

CHAPTER I

GENERAL TECHNIQUE AND PATHOLOGY

RADIOGRAPHIC EXAMINATION of the skull and its contents is now securely established as a most important method of investigating all cerebral disorders associated with a rise of intracranial pressure, or with symptoms indicating a progressive course. Almost every form of expanding lesion within the cranium, whether tumour, large aneurysm, or infantile hydrocephalus, will produce in time local or diffuse changes in the radiographic appearance of the cranium and the evidence thus furnished sometimes provides a peculiarly direct indication of the presence and situation of the lesion and even of its nature.

The localisation of expanding intracranial lesions, such as tumour, depends primarily on a careful study of the patient's symptoms and an accurate and detailed neurological examination. However, the mind of the patient may be so disturbed by cerebral damage that investigation of the functions of many of his nervous pathways becomes almost impossible; in other cases the tumour may develop in a "silent" area of the brain and give no localising signs until its advancing margins, perhaps far from the origin of the lesion, begin to disturb known pathways; or the tumour may so distort the brain as to produce damage in distant parts of it, with the result that the patient has physical signs susceptible of faulty interpretation of the situation of the lesion; as, for example, ipsilateral hemiparesis in a tumour of one cerebral hemisphere. There are, indeed, so many pitfalls that even the most expert neurologist will admit his inability to furnish in every case an accurate clinical diagnosis.

To this problem of localisation of intracranial tumours radiology has contributed much.¹ It brings evidence of an entirely different kind from that obtained by clinical examination, evidence of a direct visual order which

¹ In 1931 from plain X-ray studies Sosman was able to predict the location of the intracranial tumour in 50 per cent. of the cases submitted from Cushing's clinic, and to give an accurate opinion as to the histological type of the tumour in 25 per cent. In 4 per cent. of the same series radiograms suggested the presence of tumour where none was found.

Bibliography. A bibliography is given at the end of Chapters II to VII. It is not comprehensive, but is intended as a guide to more detailed reading.

provides a cross-reference on the map of topographical diagnosis. The value of ventriculography, encephalography and angiography will be referred to later; in this chapter we will deal with simple X-ray examination. Fig. 1 shows a large left fronto-temporal meningioma in a patient whose predominant clinical signs when she first came under expert neurological care were papilloedema, left facial palsy of peripheral type, and bilateral pyramidal

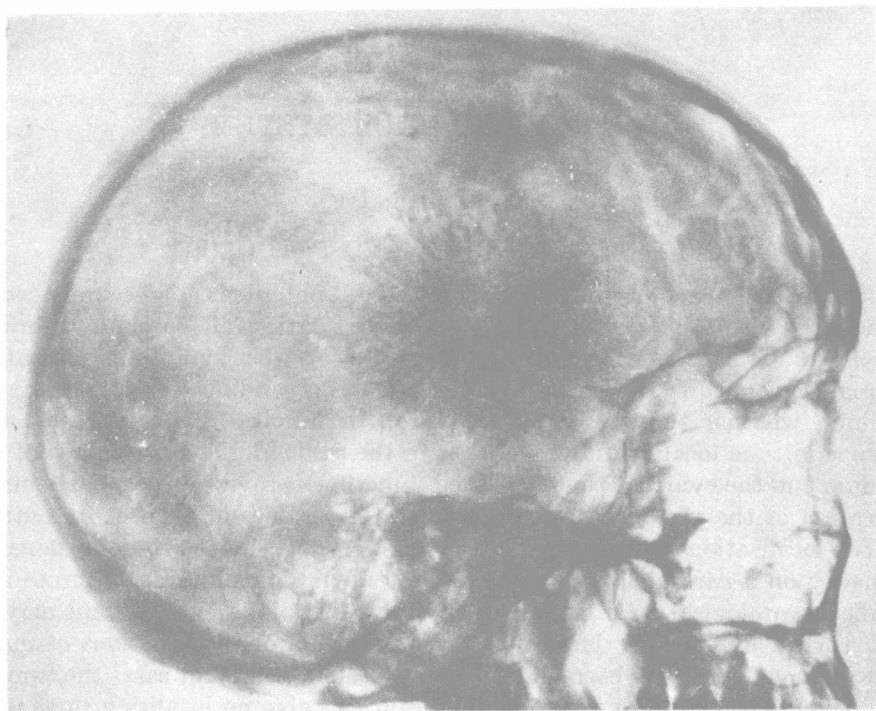


FIG. 1.—Ossifying left fronto-temporal meningioma without hyperostosis. Case No. 66.

signs. The first diagnosis was tumour of the pons. Radiograms were then taken, and the shadow of the tumour was seen. Shortly after this the facial palsy almost disappeared, and further consideration of the history of illness left little doubt that the lesion shown by radiography was responsible for the patient's symptoms. The clinical problems presented by this case were not insoluble, but, without the help of radiograms of the skull, a false conclusion might have been reached that operation gave no chance of relief, or operation might have been directed towards the wrong part of the brain.

We have had other cases of this type in which the first clue to accurate localisation of the tumour has been from the radiograms. There are, too, cases in which the first definite evidence that the patient was suffering from an intracranial tumour, and not from some other nervous disorder, has been

provided by radiographic examination. Sometimes, as in the case described above, radiograms indicate not only the situation but also the nature of the tumour. It must not be concluded, however, that radiography can often help to this extent. Direct evidence of the situation of the tumour is provided by simple radiograms in no more than 10 to 15 per cent. of cases ; and then the evidence may be of such an indefinite nature that it can be considered of importance only when taken in conjunction with the clinical signs, and should be rejected if not supported by them. A doubtful fleck of calcification seen in a radiogram becomes significant when the clinical picture is in accord with its situation, and when further specially taken radiograms confirm its



FIG. 2.—Calcified plaque of the falx cerebri.

presence. Such a radiographic finding may not infrequently suggest to the surgeon that the tumour arises in an area one or even two inches in front of or behind the area in which it was thought to be ; and the osteoplastic exploration is, accordingly, shifted forwards or backwards from the site originally planned.

Even when it is nebulous, radiological evidence in a difficult case will often start the observer on a new line of thought, as a result of which the significance of the previously observed clinical signs is gauged more surely and the correct diagnosis reached. Radiologists can greatly improve their interpretation of radiograms of the head by acquiring a working knowledge of the symptomatology and pathology of intracranial tumours.

These principles are of particular importance at the present time, when the perfection of technique and increasing popularity of radiological examination are revealing more and more novel appearances on and inside the skull.

There has been a strong temptation to regard novel appearances as abnormal, and thus as the cause of the patient's symptoms. When calcification of the pineal gland was first observed radiologically it was hailed by some as evidence of insanity, for it so happened that the skulls in which this calcification was observed belonged to the inmates of an asylum. We have seen a patient with retrobulbar neuritis who was referred to us on account of a calcified mass within the cranium, and this mass, marked with an arrow in the radiograms the patient brought with him, was the shadow of a normal pineal gland. The bony strands that sometimes join the anterior to the posterior clinoid processes, and which in radiograms appear to form a bridge above the pituitary gland, have been claimed as the cause of epilepsy, of idiocy, of diabetes insipidus, and of other maladies, but further experience has resulted in the conclusion that the bridge is more apparent than real, since it does not extend into the diaphragma sellæ, and that it is within the limits of normal. It has been claimed that calcified plaques seen radiologically in the falx cerebri are the cause of a syndrome of which the major symptom is headache. Fig. 2 shows a large calcified plaque of the falx in a patient who had suffered from headaches for months. These headaches subsided after the removal of a large right parietal glioma.

Faulty radiological diagnosis may lead to negative surgical explorations, of which the following are typical examples :

(1) A man with progressive mental symptoms was found to have a calcareous plaque on the falx cerebri (similar to the one in Fig. 2) and was explored with a preoperative diagnosis of meningioma of the falx.

(2) In a patient suffering from headaches, slight left hemiparesis and hemianalgesia, radiograms showed in the right parietal bone a circular area of diminished density, and behind this area numerous large diploic channels. From this evidence it was thought at neurological consultation that the patient probably had a meningioma. A right lateral osteoplastic exploration was done. No tumour was found, but only small convolutions covered by large subarachnoid spaces. Increasing experience has shown that the appearances seen in the radiograms in this and the preceding case are really within normal limits.

(3) A patient suffering from progressive mental disturbance and fits was found to have a large area of resorption in the left frontal region, and a radiological diagnosis of left frontal meningioma was made. At operation it was found that the resorption was due to an unusually large congeries of Pacchionian granulations. The symptoms were due to severe chronic leptomeningitis probably the result of chronic alcoholism (Fig. 3).

There is clearly need for wide knowledge of the normal radiographic appearances of the head.

At this stage it is important to stress the fallacy of what might be called haphazard radiography of the skull. For example, a patient with progressive right hemiparesis is said to show no radiological evidence of intracranial

disease when the lateral pictures have been taken with the right side of the head against the film, although the probabilities are that the lesion is in the left cerebral hemisphere. Examples of this type could be multiplied from our experience. The responsibility is borne by the clinician, but the radiologist, if he wishes to get the best results, will also play his part in seeing that the type of radiographic examination is governed by the presenting clinical signs.

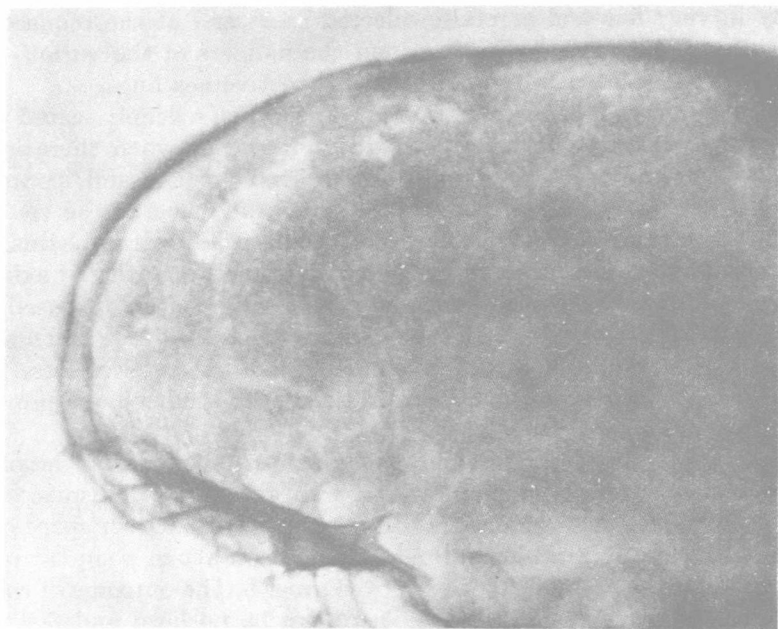


FIG. 3.—Excessive resorption of inner table of frontal bone, associated with numerous Pacchionian granulations in a case of chronic leptomeningitis. Case No. 2008.

SPECIAL INVESTIGATIONS

In addition to the evidence obtained from simple films of the skull, contrast medium can be used to demonstrate the pathways of the cerebrospinal fluid and the course and form of the blood-vessels and venous sinuses of the brain and its coverings. The ventricular system can be demonstrated either by air (ventriculography or encephalography) or by the injection of an opaque oil into the ventricles (positive contrast ventriculography); the latter is used chiefly to demonstrate the aqueduct and fourth ventricle. Cerebral angiography is usually carried out by percutaneous puncture of either the carotid or the vertebral artery. The practice of injection after operative exposure of the artery is hardly ever used now.

Encephalography, though used chiefly to show alterations in shape, size, and position of the ventricles, is used also to show the cerebrospinal fluid