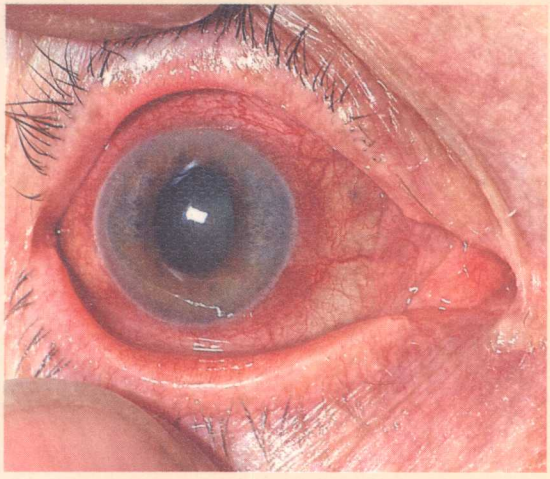
Ophthalmology in Medicine

An Illustrated Clinical Guide



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Ophthalmology in Medicine:
An Illustrated Clinical Guide

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Mosby Year Book
St Louis, Baltimore, Boston, Chicago, London, Philadelphia, Sydney, Toronto

First published in the United Kingdom in 1990
by Martin Dunitz Ltd, 154 Camden High Street, London NW1 ONE

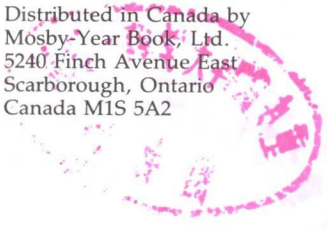
British Library Cataloguing in Publication Data

Abrams, J.D.
Ophthalmology in medicine
I. Ophthalmology
1. Title
617.7

ISBN 0 8016 00286 (Mosby-Year Book)

Distributed in the United States by
Mosby-Year Book Inc.
11830 Westline Industrial Drive
St. Louis, Missouri 63146
U.S.A.

Distributed in Canada by
Mosby-Year Book, Ltd.
5240 Finch Avenue East
Scarborough, Ontario
Canada M1S 5A2



Phototypeset by Scribe Design, Gillingham, Kent
Printed and bound in Singapore by Times Offset Pte. Ltd.

To Anita — who thought I was playing bridge

Preface

This book is intentionally designed for easy and quick reference to those eye conditions that are frequently met, the way they usually present and how they are managed. As a compact overview of the subject, it should be useful to general medical practitioners and specialists in other fields of medicine, to medical students and to those in the optical profession both qualified and in training who do not wish to get bogged down in the minutiae of an enormous tome on eye disease.

The book is divided into three parts, all of which are related but have differing aims.

- Part 1 is orientated towards diagnosis of eye conditions by the non-specialist. It lays emphasis on the significance of the history of the complaint, supplemented by an appropriate but necessarily limited examination. Some of the commoner eye conditions are enumerated in relation to the symptoms and signs described, but fuller accounts of these are found in Parts 2 and 3.
- Part 2 aims to give basic formal descriptions of the main conditions. Each of the conditions is grouped as (1) a disturbance of the visual apparatus (2) an anomaly of the protective mechanism or (3) some kind of incoordination of the two eyes. Where appropriate, the routine and specialist examinations performed by the ophthalmologist are described.
- Part 3 discusses matters of general ophthalmology both from within the subject itself and in relation to other disciplines. These chapters emphasize the frequently overlapping topics of common interest to the ophthalmologist and the specialist concerned. There has been some judicious pruning of specialties as it is arguable that an interrelationship can be found between ophthalmology and practically every other speciality.

Cross reference between the three sections is inevitable, but to a certain extent they can be read independently:

- Part 1 as a diagnostic *vade mecum*
- Part 2 as a mini textbook of ophthalmology
- Part 3 as a guide to the place of ophthalmology in the general medical scheme of things.

This independence between the parts has been further encouraged by some duplication of the material.

Emphasis throughout the book is on the commonly occurring conditions; the word 'rarely' is rarely found. The reader should refer to larger texts (indicated in the Select Bibliography) if some unusual topic is not mentioned, or if the elaboration of a topic appears incomplete. In particular, those details

of anatomy and pathology not having established clinical relevance, however intrinsically important, have been intentionally omitted.

It is assumed that the reader has some elementary knowledge of the structure and optics of the eye, acquired in general and pre-clinical studies. This book is therefore essentially a basic clinical presentation of the subject.

Acknowledgments

It is a pleasure to acknowledge my great debt to colleagues who have supplied me with illustrations. These include Professor Neil McIntyre, Professor Wallace Foulds, Tony Chignell, Binnie Dandona, Andrew Dhillon, Bob Dick, Bill Dinning, Ian Mackie, Marie Restori, Imri Sarkany and Alan Valentine.

I am particularly indebted to the staff of the Royal Free Hospital, notably my colleagues, Clare Davey and John Bolger, as well as to the Medical Illustration Unit of the Royal Free Hospital School of Medicine, who have been so helpful. My thanks, too, to Peter Harvey for casting a critical eye over the section on neurology.

My own secretary, Bunny Morgan, and editors Mary Banks and Pat Knightley, deserve special mention for their tireless efforts and seemingly infinite patience.

D. A.

Contents

PART 1: THE PRESENTATION OF COMMON EYE DISEASES

The complaints of patients regarding vision or some abnormality of the eye itself, or of its surrounding structures, form the bulk of this part of the book. As far as examination techniques are concerned, a comparison is made between those appropriate to the non-specialist and those carried out by the ophthalmologist or optician. In order to make this comparison, a clarification of the roles of the various professionals concerned with eye disease is first given.

It is hoped that, using this information, the non-specialist will pay great attention to the patient's history, will be conscious of the limitations of his examination techniques and, finally, will make the right decisions on referral.

1 Normal sight and how it may fail

Central to the whole subject of eye disease is the patient's complaint of a deterioration in the sight of one or both eyes. To appreciate the ways in which a patient's vision can be affected, it is helpful to understand the mechanism of normal vision.

NORMAL VISION

The structures of the eyeball (the camera of the visual system) are coordinated so that, in normal vision, rays of light from a distant viewed object pass through optically transparent elements. These are, the cornea, aqueous humour, lens and vitreous humour (Figure 1.1). The elements focus the rays sharply as an inverted image on a light-sensitive layer, the retina. By an alteration in the shape of the lens (the process known as accommodation), the retinal image can be kept sharp when an object occupies a position requiring near vision (Figure 1.2).

The retina lines a large part of the back of the eyeball, but a particular part of it, the central area known as the macula, is responsible for the most refined vision; it is on to this area that any object requiring special attention is imaged. The macula therefore subserves central vision.

The retina consists of many layers of nerve cells and fibres, but the actual light-sensitive cells are of two types, cones and rods (Figure 1.3).

- Cones are responsible for day vision, for the accurate perception of forms and shapes, and for colour vision; they predominate in the macular area, although they are present elsewhere in the retina.
- Rods come into play for night vision and are widely distributed throughout the retina, though they are scarce at the macula itself.

The rods and cones are situated in a layer on the outer aspect of the retina, and light has to pass through the inner retinal layers in order to reach them.

Nervous impulses from the rods and cones are transmitted via various cells and fibres of the retina, eventually to pass out of the eyeball into the optic nerve and the visual pathway. Finally they reach the visual part of the cerebral cortex at its most posterior part, the occipital lobe. The signals from the two eyes are processed (analogous, one might say, to the developing and printing of a photographic system) so that a single erect image is received in consciousness.

Clear sight therefore depends on three essential components:

1 A sharply focused retinal image

2 The functional integrity of the retina

3 An intact visual pathway and visual cortex.

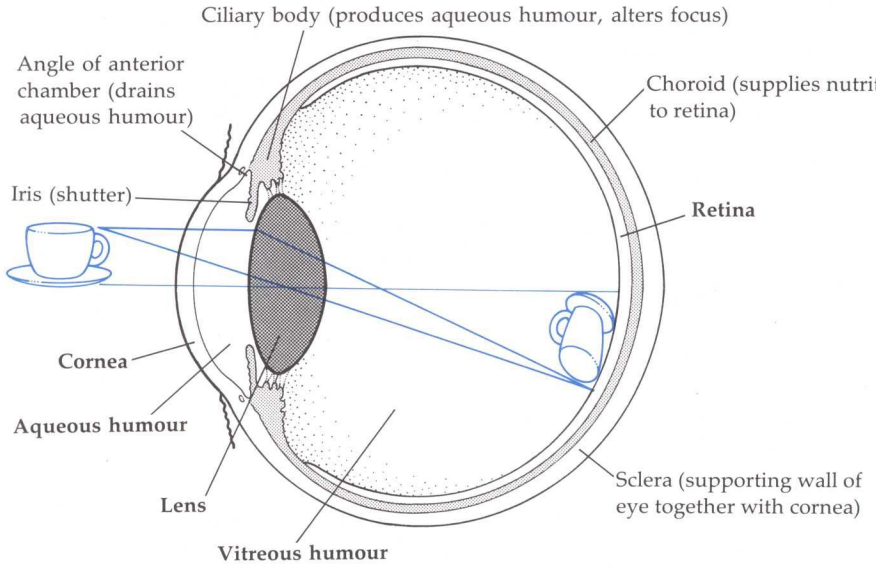


Figure 1.1 The structures of the eyeball. Those directly concerned with vision are labelled in bold type.

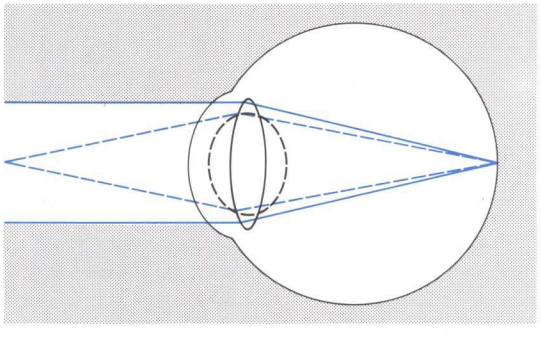


Figure 1.2 Accommodation. The lens bulges, increasing its optical converging power.

If any of these essential components is lacking, the vision will to some degree be defective.

BLURRED VISION

It is always possible to explain blurred vision on the basis of the three components mentioned above. In other words, the cause will be a poor quality retinal image, some disease of the retina itself, or a neuro-ophthalmic disorder.

Defects of the retinal image

The conditions degrading the retinal image may be subdivided into two categories: optical causes and opacities of the ocular media.

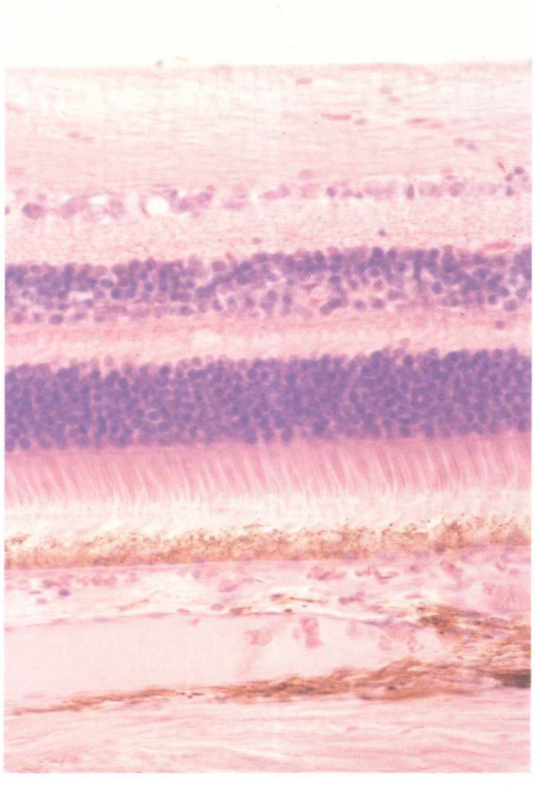


Figure 1.3 A photomicrograph of the retina, choroid and sclera. The broad dense layer is that of the nuclei of the rods and cones. The cones are immediately next to the pigment epithelium, separated here by an artefactual gap. The inner aspect of the retina is above the rods and cones. It should be noted that the light has to pass through most of the layers of the retina before reaching the rods and cones.

Optical causes In practice an unclear retinal image is the commonest cause of the complaint of blurred vision and is most likely to be due to an optical disturbance—one of the refractive errors, for example, myopia, hypermetropia, presbyopia or astigmatism (see Chapter 7). In these conditions, no actual disease of the eyeball is present, but refraction does not form a clear image on the retina. It is as if the 'camera' is simply not focused properly.

1 Blurred distance vision is the characteristic of myopia (short-sightedness)

2 Blurred near vision may occur in hypermetropia (long-sightedness)

3 Blurred near vision is also the presenting complaint of presbyopia, owing to progressive loss of the power of accommodation. As noted, this is a function leading to increased curvature of the surfaces of the lens of the eye, allowing it to change focus from far to near distances. Presbyopia typically starts in middle age.

It is important to realize that while refractive errors are the commonest conditions giving rise to blurred vision, they never cause severe loss of sight, neither do they occur acutely. An optometrist or optician is professionally trained to recognize and treat such optical errors with spectacles or contact lenses.

Opacities of the ocular media The refractive errors apart, an important group of conditions that cause blurred vision are the opacities of the normally clear ocular media.

The media (the cornea, aqueous humour, lens and vitreous) can become cloudy at any time of life, but the commonest and most important condition is senile cataract (see Chapter 10), an opacification occurring in the lens of the eye in old age.

Retinal disease affecting vision

Blurred vision may occur in retinal disease, particularly when the central region (the macula) is involved. When the central vision is affected, it is especially difficult to see well enough to do detailed, close work and, in the elderly, degeneration of the macula is a great problem because it will interfere with reading and writing (see Chapter 12).

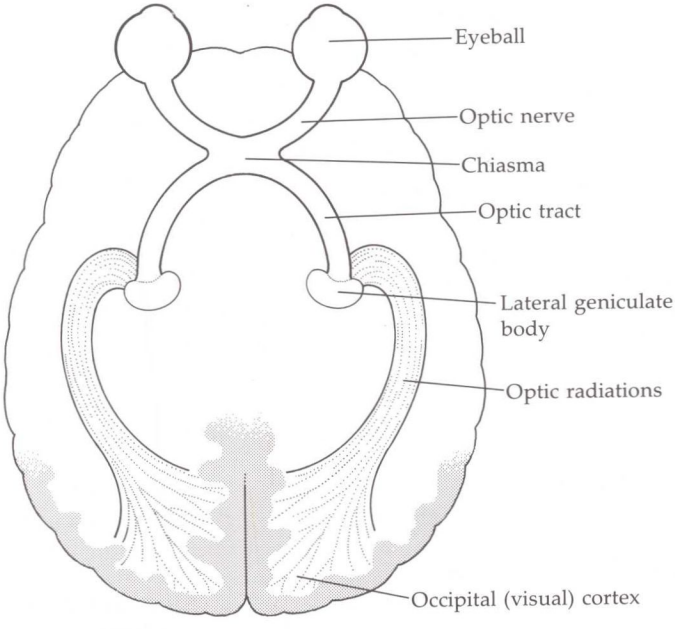


Figure 1.4 The visual pathway.

Retinal disease affecting parts other than the macula may be unnoticed, but if a defect of sight occurs, it takes the form of a field defect which matches up with the particular area of the retina involved. As the image on the retina is optically inverted, the patient's complaint is given in the opposite sense. For instance, if a retinal detachment occurs in, say, the nasal (medial) half of the retina, the patient will notice a 'shadow' obscuring the temporal (lateral) half of the field of vision.

Involvement of the visual pathway

Conditions involving the visual pathway (Figure 1.4) and visual cortex are numerous and the precise way in which the sight is affected depends on the whereabouts of the lesion. Disorder of one optic nerve affects the vision of the eye from which it originates. A disturbance of or behind the chiasma, where some of the optic nerve fibres from each eye cross over to the opposite side is likely to affect the field of vision

of both eyes. A typical example is a homonymous hemianopia, the loss of half the field of each eye following the common type of stroke. (This disorder is discussed more fully in Chapter 24.)

Important features of the history of visual disturbance

The important features here are as follows:

1 The severity of the disorder

2 What the onset was like

3 The course of the condition

4 Whether one or both eyes are affected

5 Whether the disturbance affects a particular visual function

6 If the sight is affected for distance and near vision, or if one of these is particularly affected

7 Particular factors making the sight worse

8 The patient's general health

9 Any family history

10 The age group of the patient.

1 The severity of the disorder

The severity of the disorder is the first thing to consider. While optical problems (Chapter 7) blur the sight, they never give rise to anything that the average patient would describe as losing the sight altogether, or blindness.

All other conditions affecting the sight may progress to, or indeed first appear as, a severe visual disturbance which the patient may describe as blindness.

2 What the onset was like

The common causes of sudden loss of vision are:

- Vascular accidents in the retina (Chapter 22) or optic nerve
- Haemorrhages into the vitreous and into the macular region of the retina (Chapters 11 and 12)
- Some cases of retinal detachment and acute glaucoma (Chapters 12 and 13)
- Optic neuritis (Chapter 24).

Although occasionally an optical problem or a cataract is noticed suddenly, it does not arise suddenly and it may simply be that the patient became aware of it at one particular juncture.

3 The course of the condition

If the onset of the condition was rapid, the patient's past and immediate history are important. For instance, have there been any previous episodes? Is the visual loss still present or has there been some recovery? Examples of this are subacute glaucoma (see Chapter 13) and transient ischaemic attacks (TIAs) of a much shorter duration (see Chapter 22), perhaps seconds or minutes, and migrainous interference with sight which commonly resolves after ten to twenty minutes, to be followed usually, but not invariably, by a headache (see Chapter 4).

If the disturbance was of a slow onset, is it now progressing or stationary, or is it slowly recovering as, for example after a small vitreous haemorrhage?

4 Whether one or both eyes are affected

Optical errors commonly affect both eyes, but not invariably. Disease of the structures of the eyeball may occur unilaterally, though the condition is often present in both eyes, perhaps to a greater extent in one than the other eye. For example, senile cataract is usually more advanced in one eye than the other.

Sudden involvement of the vision of both eyes simultaneously is most likely to arise from a cortical vascular disturbance, rarely from the eyes themselves.

5 Whether the disturbance affects a particular visual function

A general blur in vision should be distinguished from something involving either the central vision or a peripheral defect; a complaint, say, about the central vision only, would be most unlikely in a condition which simply interferes with the clarity of the retinal image generally.

A defect of the visual field is never an optical problem. Upper or lower (vertical) field defects are often retinal in origin. Lateral or medial defects can arise from retinal, glaucomatous or neurological conditions.

6 If the sight is affected for distance and near vision, or if one of these is particularly affected

Intermittent blurring of near vision is often optical in nature, arising from partial failure of accommodation which may be age-related (presbyopia) or drug-induced.

7 Particular factors making the sight worse

An example of other factors making the sight worse is the patient's vision being especially bad in bright light, for example, some form of cataract (see Chapter 10), or in poorly lit circumstances, such as night blindness in retinitis pigmentosa (see Chapter 12).

8 The patient's general health

Additional information may be obtained from the patient's general medical history. The presence of such conditions as hypertension or diabetes is obviously important in the differential diagnosis of visual disturbance.

9 The family history

There is sometimes a family background to major eye diseases. For instance, senile cataract may have been present in the patient's parents. Other examples of a familial and inherited tendency are high degrees of myopia and the primary glaucomas.

Another reason for enquiring about the family history is to reveal the patient's anxiety about possible causes of the deteriorating vision.

10 The age group of the patient

The patient's complaint may be age-related:

- Children may or may not complain about their vision, but the parents may have noticed the child peering, or a routine school examination may have found the vision to be defective. This is the period of life when refractive errors are usually first discovered, particularly myopia in the ten- to twenty-year-old age group.

- By the early twenties, most individuals needing spectacles will have been supplied with them. The next group of patients requiring spectacles will be those who were hitherto optically normal but find in their early forties that reading is progressively difficult—they have presbyopia.

- Otherwise, between the ages of twenty and fifty years, there is normally a 'quiet' period as far as visual trouble is concerned. Some hypermetropes start to need reading spectacles rather earlier than the presbyopic age group. However, from the point of view of organic disease, the most important condition in this age group is diabetes, which may give rise to retinopathy, an extremely serious affection in middle life.

- After fifty years of age, a gradual increasing incidence of cataract and primary glaucoma begin to feature (see Chapters 10 and 13). After