drawing taken from life. The optic nerve has become medullated beyond the disc, and when these medullated fibres are present the disc loses its sharp edge and the vessels disappear and reappear from the mass of white tissue so that there is a very definite resemblance to papilloedema. It will be noticed, however, that the surface of the nerve head is not elevated, and that the white area is not uniformly continued around the disc. Also there is an entire absence of oedematous or haemorrhagic change on or around this area. The veins, too, are not enlarged.

Let me repeat once more, learn to examine the normal fundus first before proceeding to the pathological.

OPHTHALMIC EMERGENCIES IN GENERAL PRACTICE

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In an article of this type it is impossible to deal even shortly with all the conditions which might come under this head, and I have therefore excluded all conditions (e.g. lids), which are not entirely ocular, and those where early treatment is not of prime importance.

The importance of taking a careful history in all cases cannot be over-emphasised, especially when a foreign body is suspected.

Examination must be made in a good light with adequate magnification. If there is much blepharospasm, 4 per cent cocaine may be instilled, or in a child a short general anaesthetic may occasionally be necessary.

In doubtful cases, it should be remembered that the use of atropine in patients under forty is practically always safe, and often indicated. Over forty there is always the danger of precipitating an attack of glaucoma in a subject with a tendency that way, or in cases where glaucoma is present, but not diagnosed, of making the condition infinitely worse.

Injuries

Foreign Bodies.

(a) *Conjunctival*.—Foreign bodies, usually tiny pieces of grit, are a frequent source of trouble. The most common position is in the upper fornix, often about 2 or 3 mm. from the lid margin. Sometimes the foreign body is at the very apex of the fornix, so that when the lid is ordinarily everted it cannot be seen. If, with the lid still everted, the eye is pressed on from above, the remainder of the conjunctiva will roll out in a fold, bearing the foreign body with it. When found, the foreign body may be removed with a piece of sterile cotton-wool, or the corner of a clean handkerchief. If very adherent it must be picked out like a corneal foreign body (*q.v.*). The eye should be irrigated with saline for a day or two after.

(b) *Corneal*.—As a rule these need a spud, or even a needle, to move them. The eye must be thoroughly cocainised. One of the commonest foreign bodies found on the cornea is a black speck from an emery wheel. It usually embeds itself firmly in the cornea, and when the main portion has been removed leaves a little brown ring, which should also be cleared as much as possible, though care must be taken not to cause more harm to the eye by deep digging, causing subsequent scarring, than would be the case if a little of the ring were left. The eye should be irrigated with saline after the removal of the foreign body, and drops of atropine, 1 per cent instilled, and where there has been much digging, a pad and bandage applied.

(c) *Intra-ocular*.—See "perforating injuries."

Abrasions.

Abrasions of the cornea are common. The eye is injected and watery, and the patient usually thinks that a foreign body is present. The cornea will often appear quite normal on casual inspection, but staining with fluorescein will show a bright green area where the cornea has been denuded of epithelium.

Treatment.—Irrigation with warm saline, and immobilisation of the lids with pad and bandage. Where a large area is affected, or there is any sign of infection (showing as cloudiness of the cornea in and round the wound), atropine 1 per cent may be used. These abrasions are often extremely painful, and sedatives may be necessary. Sometimes after months or years the epithelium peels off again in the same place, and symptoms recur.

Burns.

Often associated with foreign bodies, which should be removed as much as possible. In the case of lime burns, all fragments of lime must be extracted, and the eye washed out with neutral ammonium tartrate.

The eye should be regularly irrigated with saline, and ung. atrop. 1 per cent used, except in very slight cases. Sulphonamides may be used locally.

Contusions and Concussions.

These may cause hyphaemia, or haemorrhage into the anterior chamber. This may be only a little fleck of blood at the bottom, or may fill the entire anterior chamber.

Treatment.—Atropine and rest. The blood usually clears entirely, but other damage may be found deeper.

The iris may be dilated and inactive as a result of a blow, and often remains so permanently. (Traumatic mydriasis.) Sometimes it is torn away at the root from its ciliary attachment. (Iridodialysis.) Iritis (*q.v.*) may occur with an injury.

The lens may be dislocated. This is one of the most serious results of non-perforating injuries to the eye, and may be partial or complete. A partially dislocated lens causes a variation in the depth of the anterior chamber, as in one place the iris is pushed forwards, while in another the lens is tilted back and gives it no support. At this part the iris will be seen to quiver whenever the eye moves (tremulous iris). This is an infallible sign of a displacement or absence of the lens. When the pupil is dilated, the edge of the lens can be seen as a crescentic black line across the pupil, and in some cases with sufficient displacement, two discs can be seen simultaneously, by the indirect method of ophthalmoscopy, one through the lens and one through the aphakic gap. Complete dislocation of the lens may occur backwards into the vitreous or forwards into the anterior chamber. A lens which is only slightly displaced, or which has been driven well into the vitreous, may settle down without causing much disturbance to the eye, but more usually there is trouble from secondary glaucoma or iritis.

Treatment.—Rest. It is as a rule better not to use myotics or mydriatics. The lens may have to be removed.

Vitreous haemorrhage.—Haemorrhage into the vitreous (from surrounding structures) frequently follows a blow; it is often accompanied by other damage to the eye. It varies in amount from just enough to cause slight haziness of the media to complete filling of the vitreous with blood, so that no red reflex at all is obtainable. A mydriatic should be instilled and the eye bandaged: the patient should be put to bed and kept quiet. The slighter cases will clear up completely, but the more severe ones are very slow, opacities often remaining, and organisation of the clot sometimes occurring.

Choroidal rupture may occur, though it is often not visible at first owing to blood in the vitreous.

Retinal detachment (*q.v.*) is a fairly frequent occurrence.

Rupture of the globe sometimes follows great violence. The eye is soft and full of blood. The contents may be extruded. In the slighter cases repair may be attempted.

Penetrating Injuries

The cornea may be penetrated by a flying fragment or pierced by some sharp instrument. The aqueous is lost, so that the iris is up against the wound, and in many cases prolapsed through it. Prolapsed iris should never be replaced, owing to the great risk of sympathetic ophthalmia. Small central wounds of the cornea, with no prolapse or incarceration of iris, and no wound of lens, often heal well, if clean. Atropine should be instilled and a firm pad and bandage applied. Cases with prolapsed iris need iridectomy as soon as possible.

Wounds of the corneo-scleral region, and others in which iris is entangled, are very liable to bring on sympathetic ophthalmia. This is a severe plastic iridocyclitis which occurs in one eye following an injury to the other (the exciting eye). In these cases the exciting eye does not quiet down, but continues red and irritable. There is ciliary injection (a violet flush surrounding the cornea), and keratic precipitates may be seen on the posterior surface of the cornea. Later on, the other eye begins to exhibit the same symptoms, unless the exciting eye is removed in time. But if the sympathetic ophthalmia has already started, the exciting eye should not as a rule be removed, as the sympathising eye may finally be the worst of the two.

Sympathetic ophthalmia practically never follows suppuration.

Wounds of the lens allow access of aqueous through the capsule to the lens fibres which swell up and gradually become opaque; the opacity usually extends gradually through the whole lens. If the wound is large, masses of cloudy lens-matter escape and float about in the vitreous. In young people, complete absorption of the lens matter may finally take place: or the remains of the lens may have to be broken up. In older people with a hard nucleus an extraction is necessary if the eye is to be used again.

In giving a prognosis, it should be remembered that an aphakic (i.e. lens-less) eye will not work with a normal one unless a contact-lens is worn.

The special danger of wounds of the lens is secondary glaucoma, brought on partly by the swollen lens pushing the iris up against the cornea and blocking the filtration angle, and partly by the difficulty of filtration of the aqueous charged with lens matter. If glaucoma supervenes, a curette evacuation of the lens matter must be performed. If not, the treatment is with atropine and a pad and bandage.

Intra-ocular foreign bodies.—Any perforating wound of the eye is potentially caused by an intra-ocular foreign body. In cases of doubt the most careful investigation must be made, especially with X-rays. If found, an effort must be made to remove it, unless such removal is likely to cause destruction of useful vision. Foreign bodies in the cornea, anterior chamber or iris may be removed with a magnet. Those in the lens can be removed after a few days by a curette evacuation of foreign body and swollen lens substance. A foreign body in the vitreous may usually be coaxed out with a magnet.

Retained foreign bodies may be a source of sympathetic ophthalmia. In addition, iron fragments cause siderosis bulbi—a condition in which tiny particles of iron are gradually deposited throughout the eye, causing degenerative changes and gradual loss of vision. Copper often sets up a severe suppuration, followed by shrinkage of the globe. This suppuration is due to a chemical reaction, and not to pyogenic organisms.

Septic perforating wounds of the eye often terminate in panophthalmitis and loss of the eye.

Detachment of Retina

In this condition the retina is pushed, comes adrift from, or is pulled from its moorings.

1. *Simple.*

- (a) Traumatic.
- (b) High myopes.
- (c) Following sub-retinal haemorrhage.
- (d) Exudate (e.g. in eclamptic patients).

2. *Over an intra-ocular tumour*, either neoplastic or inflammatory.

3. *Traction* caused by pulling on the retina of strands of connective tissue in organisation of haemorrhage or exudate.

1. There is often a history of a blow on the eye or head or some excessive strain, such as lifting a very heavy weight. This history is sometimes absent, especially in the high myopes who are prone to this condition. The patient complains of a painless mistiness of vision in one eye sometimes preceded by black spots or flashes of light. Often they observe that a "veil" or "cloud" has cut off part of the field of vision. Central vision may be unimpaired at first, but the blind area gradually increases and finally the macular region is affected. In the early stages the pupil reacts normally, and it may be very difficult to see the difference between a shallow detachment and normal retina. Sometimes illumination with a plain mirror gives a better guide than anything—the red reflex is seen to be much less bright over the area of detachment. Tension usually normal—may be up in cases secondary to tumour, down in late cases of simple detachment. On examination with the ophthalmoscope by the direct method, the detached part of the retina appears whiter than normal with folds or crinkles that are whiter still. The vessels are very tortuous as they follow the undulations of the detachment, and appear much darker than normal. A hole in the detachment may show up as a brighter red area. Vitreous opacities are often present. The detached part of the retina will be in focus with a more + lens than the disc.

Note that the detachment is opposite the field defect, i.e. above, when the defect is below, and temporal when it is nasal.

Operation is the only effective treatment. Until this can be carried out, the eye should be atropinised and bandaged, and the patient kept at rest.

2. *Tumour*.—The detachment is much more regular in outline, not translucent, and has no holes in it. (In certain cases a simple detachment may overlie a neoplasm.)

Treatment is excision of the eye if the swelling is malignant.

3. *Traction*.—Long history of eye trouble. Fundus disease and bands in the vitreous can be seen.

Treatment of the detachment is of little avail.

Conditions which have a somewhat similar history and symptoms to simple detachment are:—

- (1) Local vascular accident. Fundus picture will decide.
- (2) Cerebral vascular accident. Both eyes affected symmetrically; general symptoms.
- (3) Cerebral tumour. Slower, papilloedema often present, and general symptoms.
- (4) Chronic glaucoma + tension. Cupped disc, usually sluggish pupil, typical field.
- (5) Retro-bulbar neuritis. Pupil usually affected, often pain on moving eye, disc blurred (not always).
- (6) Acute choroiditis. Field loss usually an isolated patch, vitreous opacities very dense choroiditis shows as a very blurred whitish patch or patches. In extensive areas of acute choroiditis there is some obvious lifting of the retina.

The Acute Red Eye

I do not think I can do better than re-publish the following table which I originally worked out for an article on Glaucoma in the *Clinical Journal* (July 29, 1931).

I am much obliged to the Editor and Publishers for permission to use it again.

This gives the differential diagnoses and histories. Other points about these three conditions are given later.

	Acute Glaucoma.	Acute Iritis.	Acute Conjunctivitis.
<i>History</i>	"Flashes of light in front of eyes" "Rainbow haloes," round lights. Transitory mists over sight, clearing up after a time. Gradual deterioration of sight, noticed especially in the evenings. Sudden loss of vision with onset of acute attack.	Often previous attacks of inflammation.	Rapid onset. There is often a history of similar cases in the same house, street or school.
<i>Age</i>	Nearly always over 40. Never in children except with an enlarged eye (buphthalmos).	Rare in children, except with interstitial keratitis.	Any age. Very common in children.
<i>Appearance of Patient.</i>	Patient often appears very ill.	—	—
<i>Pain.</i>	Very intense, with nausea and vomiting. Usually mainly in the eyeball itself, though severe headache is present.	Often severe resembling toothache.	"Scratching" and "burning" in character, not very severe.
<i>Secretion.</i>	Tears (slight).	Tears (slight).	Muco-purulent, or purulent secretion often in considerable quantity.
<i>Lids.</i>	Normal.	Normal.	Often swollen. Injection of palpebral conjunctiva.
<i>Conjunctiva.</i>	Injected. Vessels perforating the sclera around the limbus are very congested.	Injection may be only slight.	Injection marked, but less close to cornea.

	Acute Glaucoma.	Acute Iritis.	Acute Conjunctivitis.
<i>Ciliary region.</i>	—	Lilac tinge of true "ciliary injection."	—
<i>Cornea.</i>	Hazy and anaesthetic. Small bullae may be present on anterior surface.	Deposits on back of cornea resembling mutton fat ("K.P."). Often some deep keratitis.	Clear.
<i>Anterior chamber.</i>	Shallow, except in certain cases of secondary glaucoma.	Normal depth. Aqueous more or less cloudy.	Normal.
<i>Pupil.</i>	Dilated, oval, and inactive.	Constricted and sluggish or completely inactive. On giving a mydriatic dilates irregularly, leaving spots of iris pigment on anterior surface of lens.	Normal.
<i>Iris.</i>	Iris pattern clear. (There may be atrophy in long-standing cases. Dilated vessels may be seen.)	Pattern blurred, giving the iris a "muddy" look. Colour is often noticeably different from that of the other iris.	Normal.
<i>Fundus and Media.</i>	"Cupped" disc where chronic glaucoma has been present.	There may be associated vitreous opacities and choroiditis.	Clear.
<i>Tension.</i>	Much increased.	Normal (occasionally sub-normal), except in cases with bombe iris and some with much exudate into the anterior chamber.	Normal.
<i>Vision.</i>	Rapid loss, almost complete	Not greatly impaired as a rule.	Unimpaired.
<i>Visual fields.</i>	Constricted, especially on the nasal side, with enlargement of the blind spot.	Full.	Full.
<i>Other eye.</i>	Seldom simultaneously affected, but may be shortly afterwards. "Cupped" disc often seen.	Seldom simultaneously affected. Signs of old iritis may be present.	Often bilateral.

Acute Glaucoma

Glaucoma may be primary, where the rise in tension arises without any cause, or secondary to such things as intra-ocular tumour, iritis, thrombosis of the central retinal vein, etc.

Acute glaucoma is usually an exacerbation of the chronic disease, but may arise entirely *de novo*, as the so-called "congestive" glaucoma. Onset is often very acute, with rapid deterioration of vision to almost nil, with great pain in the eye. Before the onset there may be a history of chronic glaucoma (see table).

Treatment.—Eserin must be applied to the eye in concentrated form: oily eserine 1 per cent may be used every 10–15 minutes for several hours, combined with hot bathings, and one or two leeches applied over the outer margin of the orbit. The patient should be put to bed, and it is well to give a purge. Evipan by mouth will help the patient to sleep, and is said to lower the tension. Sometimes, quite soon after the eserine treatment is begun the pupil will contract, the cornea clear, and the tension come right down.

If the tension does not come down to normal, or nearly so, after a day or two of intensive treatment with eserine, operation must be considered. In those cases with high tension a broad iridectomy may be performed, or else a posterior sclerotomy preparatory to trephining. In those that have responded to some extent, or in which the original tension was not very high, trephining may be performed straight away.

Iritis

Iritis is usually associated with more or less cyclitis (inflammation of the ciliary body). It may be due to one of many causes, and there may in addition be some local exciting factor, e.g. cold, injury. One often hears of "rheumatic" iritis; it is true that rheumatism and iritis often occur in the same subject, but the fact is that the two conditions are due to a common cause—the iritis is not due to the rheumatism.

In fact, the causes of iritis may be said to be those of rheumatism, with tuberculosis, syphilis, and sympathetic inflammation added. There are other rare causes, such as meningococcus and pneumococcus. Iritis of a severe type occurs in diabetics.

Some septic focus, e.g. teeth, tonsils, is a frequent cause of iritis, and must be diligently sought.

a. Syphilitic iritis may occur in the secondary or tertiary stages of the disease (sometimes showing little nodules near the edge or base of the iris), or in congenital cases (nearly always in association with interstitial keratitis).

b. Gonorrhoeal iritis is usually acute and severe. It has a marked tendency to recur, and often affects the other eye. There is sometimes a gelatinous cloud of exudate in the anterior chamber.

c. Tuberculous cases are comparatively painless and chronic. There are often little tubercles to be seen on the iris. The prognosis is very bad.

d. Sympathetic ophthalmia is a severe plastic irido-cyclitis which occurs in perforating injuries of the eye involving the iris or ciliary body, especially where there is actual prolapse of pigmented tissue which has not been removed. After an interval of anything over ten days the injured ("exciting") eye shows signs of iritis, and if it is not removed the uninjured ("sympathising") eye becomes involved, and may finally be in a worse state than the other.

(1) *Treatment*.—The cause of the condition must if possible be found, and treated. In spite of the most careful investigation it often happens that this is not successful. In the case of doubtful teeth, it is better not to extract in the acute stages, and to take only one or two at a time, otherwise an exacerbation of the condition may occur.

(2) *Local treatment* is directed to (a) *dilating the pupil*: in slight and early cases application of atropine 1 per cent as ointment or drops may suffice, or stronger measures, such as the use of 2 per cent atropine + 2 per cent cocaine, or the subconjunctival injection of "mydracaine," may be needed to pull the pupil wide open: (b) *relieving pain*: the eye should be covered with a pad and bandage, frequent application of heat, moist or dry, used, and if obtainable a leech or two applied at the outer canthus.

(3) *General treatment*.—During the acute stage the patient should be kept in bed on a light diet. The bowels should be kept well open. Sedatives may be necessary for the pain. In some cases a course of salicylates is helpful.

Acute Conjunctivitis

Usually due to infection, though in cases with little discharge, may be due to irritation of foreign body, bright light, etc. It must be remembered that conjunctivitis may be followed by corneal ulcer, and in any case the symptoms are similar, especially in the less acute cases, so the cornea must always be carefully inspected.

In the more severe cases a culture from the conjunctival sacs should be taken before treatment is commenced.

In simple cases treatment consists in irrigation of the eyes with antiseptic lotion, such as hydrarg. perchlor: 1: 12,000, or hydrarg. oxycyan: 1: 10,000, and application of ung. flav. dil. Silver preparations, such as protargol 5 per cent, may be applied as drops, or if more drastic treatment seems to be required, the conjunctiva of the lids may be painted with silver nitrate 1 per cent or 2 per cent. This treatment is rather painful, and a drop of cocaine 4 per cent may be given before. The eyes should not be padded, though dark glasses are often needed.

The organisms most frequently found are:—

a. *Koch-Weeks bacillus*, which closely resembles the influenza bacillus. This is responsible for many of the typical "pink eye" epidemics.

b. *Pneumococcus*.—Small conjunctival haemorrhages are often seen in this case. Optochin 1 per cent drops are useful in these cases.

c. Staphylococcus aureus, especially in cases associated with phlyctenules around or on the cornea.

d. Streptococcus.—Mercurochrome 1 per cent or 2 per cent is useful. Suphonamides can be applied locally and generally.

e. Gonococcus.—Gives rise to an extremely acute purulent conjunctivitis with very swollen lids, oedema of the conjunctiva, and much yellowish pus. It is extremely contagious, and often gives rise to a severe keratitis which may end in perforation and destruction of the eye.

Great trouble must be taken to prevent spread to the other eye, by covering the affected one with a Buller's shield.

The eye should be washed out four hourly with normal saline, and the lids painted with silver nitrate 2 per cent, providing this can be done without undue risk of injury to the cornea. In cases where the lids are so swollen that the eye is difficult to get at, and folds of conjunctiva are becoming strangled, it may be necessary to divide the outer canthus to give more room (canthotomy). Atropine should be applied if there is the slightest sign of corneal involvement. In addition to these older methods, the use of sulphonamides internally and externally is of great value.

The causative gonorrhoea must of course be energetically treated.

Ophthalmia neonatorum is often due to the gonococcal, though sometimes a condition just as severe can be caused by other organisms, especially the streptococcus. Treatment as for adults, except that a Buller's shield is not used.

THE PLACE OF ORTHOPTICS IN MODERN OPHTHALMOLOGICAL PRACTICE

By MARY B. DAVIES, B.A.(Lond.)

(Member of the British Orthoptic Society)

For many years now, particularly during the last century, attempts have been made to obtain a functional cure in cases of strabismus. More often than not, pioneers in orthoptics have met with failure for two reasons: (1) not enough was known about the aetiology of the condition; (2) the only apparatus available demanded altogether too much concentration on the part of the patient. In consequence of this, orthoptic practice as a whole fell into disrepute and it was not until several years after the appearance of a really good instrument that the first hospital department was opened. Nevertheless many schools of thought decried this modern treatment on the supposition that it claimed to cure all and every case of squint. This is grossly untrue, and has caused much misunderstanding.

There appears to be a prevalent idea that orthoptics dispense entirely with operation. Certainly there are some instances where a complete cure is effected by exercises alone, whereas formerly surgery would have been the only resort. In the main, however, the crux of the matter is this: there are roughly three types of case. Some respond to orthoptic treatment only, others require surgical help as well, while there still remain those for whom a cosmetically good result, either with or without operation, is the only hope.

The chief differences between earlier practice and that in general operation to-day lie (a) in the treatment meted out to cases in the first two categories, and (b) in the more specialised selection of the cases. Improved technique is gradually perfecting the treatment suitable for selected cases, and increased knowledge of the subject is making this selection easier.

The question now arises as to who shall decide which case shall be treated and which refused. Obviously the responsibility must rest with the ophthalmic surgeon in charge of any given case, but he is generally too busy to carry out the necessarily minute tests. It is, therefore, generally desirable that as many cases as possible of muscle imbalance should be referred to the orthoptist. Her training includes a certain knowledge of elementary anatomy, physiology, and optics, besides practical orthoptics. She should, therefore, be able to make adequate tests, diagnose the condition in detail, and, after some experience, decide what chance there is of developing binocular vision. The aim of orthoptic treatment is to develop perfect binocular vision, and this possibility must therefore be explored at the outset.