

Position and size of artificial pupil.

With regard to the size and position of an artificial pupil—First if the eye to be operated on is tolerably healthy, make a *small* opening in the iris; it prevents “blurring.” Second, make the opening, if possible, behind the internal and inferior part of the cornea, otherwise in its external and superior part. Third, if both eyes are operated on, make the artificial pupils, if practicable, behind the corresponding parts of the cornea.

DISEASES OF ANTERIOR CHAMBER.

ANTERIOR CHAMBER. Change of form.

THE ANTERIOR CHAMBER is formed in front by the cornea, and behind by the iris resting on the crystalline, and as the lens varies in size at different periods of life, the form of the anterior chamber is likewise subject to variation.

Change of contents.

CHANGES IN THE AQUEOUS.—I have already described the changes which the aqueous undergoes in cases of iritis (p. 298). It may be simply discoloured, as in jaundice, or more commonly its transparency is diminished by the effects of inflammation on the cells of the iris and posterior elastic lamina of the cornea. Pus may find its way into the anterior chamber from the cornea, iris, or choroid; and lastly, its watery elements may become mixed with blood, or a clot may form in it, hæmorrhage having taken place from either the iris or choroid. Under these varying circumstances, the dimness of vision is the result of injury or disease, of far graver consequence than the abnormal state of the aqueous, which is the immediate cause of it; the latter may quickly regain its normal condition, if the disturbing influences which have affected it are removed.

Filaria in aqueous.

FOREIGN BODIES IN THE ANTERIOR CHAMBER.—In the 16th number of the *Indian Annals*, I gave the details of two cases of *filaria papillosa* in the anterior chamber of the human eye, and other surgeons have described cases of a similar kind. There is no possibility of mistaking the appearance presented by entozoa of this kind in the anterior chamber, the filaria may be distinctly seen moving about in the aqueous. Entozoa in this situation excite violent inflammation of the iris and cornea, and probably abscess of the eyeball, unless they are allowed to escape from the eye. This may usually be effected without difficulty, by puncturing the cornea with a narrow-bladed knife, which

is to be rotated edgeways as it is withdrawn from the eye, allowing the aqueous to escape with a gush, and with it the entozoon. Filaria are very frequently seen in the eye of the horse in many parts of India.

Foreign bodies occasionally find their way into the anterior chamber, and falling downwards to its lower part may generally be extracted by opening the cornea, and seizing the substance with a pair of cannula forceps.

Other foreign bodies.

While performing any of these operations, it is most advantageous to have your patient under the influence of chloroform; and subsequently atropine should be applied to the eye, and the lids be kept closed with a pad and bandage for a few days.

IRIDO-CHOROIDITIS.

Stellwag von Carion remarks that this form of disease is characterized by having, in addition to the symptoms of iritis, a very great impairment of vision, and inflammatory opacity of the vitreous humour.

IRIDO-CHOROIDITIS. Definition.

From the anatomy of the parts it is evident that inflammation of the iris is likely to spread backwards to the choroid, or it may commence in the latter structure and extend to the iris. When the disease has been in existence for some time, it is difficult to ascertain whether it began in the iris or the choroid; but practically this is not of very much consequence, as the treatment will be the same in either case. We may, however, observe as a guide in this matter, that if the affection of the eye has commenced in the iris its structure is usually very much altered, being discoloured and attenuated, the early symptoms of the disease being referrible to iritis; but if the choroid was primarily involved, we shall have a more marked history of complications depending on changes in the vitreous humour, such as marked dimness of vision, bodies floating about before the patient's eyes, and ultimately the lens becoming cataractous, the opacity often commencing in its posterior pole.

Pathology.

Cases of irido-choroiditis may for convenience of description be divided into two classes; although in practice they will frequently be found to run the one into the other, nevertheless the division is sufficiently marked in most cases to enable us to follow a definite

Two forms.

line of practice appropriate to each form of the disease.

1. SEROUS
IRIDO-CHOROIDITIS.

Symptoms.

Changes in
iris;

in dioptric
media.

Tension.

Advanced
stages of
disease:

iris bulges
forward.

Pupil
closed.

1. SEROUS IRIDO-CHOROIDITIS commences with loss of sight, usually in one eye. The patient complains of a cloud or film over the visual field of the affected eye, which increases day by day. He has little or no pain in the eye, but tenderness on pressure over the ciliary region; there is no marked photophobia. On examining the eye we shall notice slight subconjunctival injection, often limited to isolated segments of the scleral zone. The aqueous humour is turbid, and in some instances flakes of opaque matter may be detected floating in it. The posterior layer of the cornea is hazy, and dotted as in keratitis punctata. As the disease advances the iris is discoloured, the pupil sluggish, and tied down by synechia of greater or less extent to the capsule of the lens; in some cases the pupil is entirely closed by neo-plastic formations passing between it and the capsule. A few distended vessels may be seen coursing over the iris, and these are apt to give way and cause hæmorrhage into the aqueous chamber.

If the dioptric media of the eye are sufficiently transparent to allow of our examining its deeper structures, the vitreous will be found hazy with flocculent bodies floating about in it. The tension of the eyeball is normal or slightly increased.

As the disease advances the subconjunctival injection is augmented, and so also the tension of the eyeball; at the same time the patient's vision becomes more impaired. The synechia increases, and the fibrous structure of the iris is more and more disorganized, it becomes relaxed, and finally the "iris projects into the aqueous chamber irregularly, attaining a spongy appearance." This bulging forward of the iris is very marked, and is due to the collection of serous fluid behind it, forcing forward those attenuated portions of the iris which are not tied down to the capsule of the lens. In the meantime the neo-plastic growths about the pupil have been increasing, becoming organized and contracted, so that the pupil may be closed by a false membrane; it assumes an irregular shape, appearing like a minute tendinous spot in the centre of the bulging iris. When the disease has advanced thus far the tension of the globe will have

become lessened. The iris undergoes degeneration, and the patient's sight is in fact almost lost, the globe rapidly undergoing atrophy.

2. PARENCHYMATOUS IRIDO-CHOROIDITIS. — In this disease the symptoms are from the first more severe than in the serous form above described; the pain and congestion of both the deep and superficial vessels of the conjunctiva are considerable, the tenderness over the region of the choroid is marked, and the vitreous is quickly and extensively involved. The iris is much discoloured, and pressed forwards towards the cornea, so that the anterior chamber is very narrow from before backwards, in consequence of the lens being pushed forwards by masses of parenchymatous materials similar to those described in the corresponding form of iritis; and, as I mentioned when speaking of iritis, these growths on the iris are apt to degenerate into pus; so in the form of irido-choroiditis now under consideration, an hypopion is from time to time noticed in the patient's eye, caused by the degeneration of the neo-plasma in the ciliary body. Lastly, the iris in instances of this disease is frequently closely bound down to the capsule of the lens by means of this neo-plastic material when organized. As a result of the diseased action going on in the ciliary body and choroid, not only is the episcleral zone of vessels very marked, but numerous large and tortuous blood-vessels may be seen on the surface of the iris; there are, however, none of the irregular projections of the iris noticed in instances of serous irido-choroiditis, due to pressure of fluid from behind on degenerated portions of the iris; the iris is perfectly straight and even, although pressed forwards, it may be, close to the cornea.

It is hardly necessary for me to remark that a diseased action, such as that I have now described, is hardly likely to confine itself to the iris and ciliary body; doubtless, in many instances, the abnormal action involves the choroid and retina, in hopeless and endless destruction.

Prognosis.—As in iritis, so irido-choroiditis, the prognosis will be more favourable in the serous than in the parenchymatous form of disease, because, as I shall subsequently explain, the former is more amenable to the beneficial influences of an iridectomy than the latter. But whatever the form of the irido-choroiditis,

Atrophy of globe.

2. PARENCHYMATOUS
IRIDO-CHOROIDITIS.

Symptoms severe.
Pain on pressure.

Hypopion.

Closed pupil.

Iris vascular.

Prognosis.

Most favourable in serous form.

From the amount of sight.

the first point we should consider in forming a prognosis is as to the state of the patient's vision. We shall notice if he can see large objects—if he can count fingers held up before the diseased eye; if not, whether he can discern the flame of a candle in a dark room. Under the latter circumstance, we can give the patient but slight hope, for in all probability extensive lesion of the choroid and retina exists in addition to the irido-choroiditis; but if he can count fingers or other large objects held before his eyes, and the disease is of the serous variety, we may reasonably hold out to our patient hopes of improvement. We shall also be guided in our prognosis by the amount of atrophy the globe has undergone, for if the eyeball is soft and much shrunken we can hardly hope for amendment, although if its tension is only slightly diminished, there is no reason why it should not regain its normal condition after an iridectomy; in truth, it often does so.

From the degree of atrophy.

Causes.

As in Iritis.

Traumatic.

Synechia.

Treatment.

Atropine.

Iridectomy.

Causes.—The causes which give rise to irido-choroiditis are very similar, if not identical, with those which engender iritis, and these I have already noticed. Severe concussions or penetrating wounds of the eye may set up inflammation in this part, as also the entrance of a foreign body into the globe, or dislocation of the lens. Irido-choroiditis is consequently not uncommon after the operation of depression of the lens, or after extraction if lenticular matter is left in the eye. But a more common cause than any of the above is the presence of synechia binding the iris down to the capsule of the lens; this, by constantly dragging on the iris, keeps up perpetual irritation, which is in time propagated to the ciliary body and choroid, and thus a formidable attack of irido-choroiditis may be induced.

Treatment.—Evidently as synechia is the most prolific source of the affection now under our consideration, it follows that in instances of the kind we must endeavour to break down the synechia. To effect this, we may in the first place resort to the instillation of a strong solution of atropine; this failing to dilate the pupil, we must perform an iridectomy.

With regard to iridectomy in cases of severe irido-choroiditis, it may be laid down, as a general rule, that

we shall in the majority of cases have to resort to this operation; it is in fact frequently the only hope for the patient, and fortunately in some apparently most unfavourable instances of this dangerous form of disease, iridectomy has a marked effect.

It not unfrequently happens that, in attempting to perform an iridectomy in cases of irido-choroiditis, we find that the iris is so firmly bound down to the capsule near the pupil, that on withdrawing a fold of it for excision, it breaks away from its attachments to the capsule, leaving a narrow ridge of the iris in the former position of the pupil. An accident of this kind is of little consequence, but if inflammatory symptoms going on in the eye prior to the operation do not quickly subside, we may with advantage perform a second iridectomy from the other side of the eye, so that the opposite halves of the iris are cut off from one another. It is advisable under these circumstances, if possible, to cut away a portion of the upper and lower sections of the iris, so that the opening through it may be partly covered by the upper eyelid. Nor does it always follow that the excision of a second portion of the iris is sufficient for our purpose. In bad cases of irido-choroiditis we have Mr. Bowman's authority for operating and excising a third section of the iris.* One and a third. reason for this is, that it is not improbable that the space from which we have excised a piece of the iris on the first and second occasions may have been, or may subsequently become, filled in by uveal growths, preventing light from reaching the retina; nevertheless, these primary operations will have reduced the hyperaction going on in the part, so that subsequently to our third iridectomy the space occupied by the opening through the iris may remain clear; and thus the last operation is by far the most satisfactory, particularly in cases of serous irido-choroiditis. In the parenchymatous form of disease we cannot but fear, under any circumstances, that abundant neo-plasma will materially interfere with our best endeavours, and will occupy the space partially cleared by removal of a portion of the iris. In cases of this description we must not only remove a piece of the iris, but in addition

Directions for a second operation;

Management of neoplasms.

* *Ophthalmic Hospital Reports*, vol. iii. p. 230.

the neo-plastic growth behind it. The straight-hooked forceps are best adapted for removing such an iris; with this instrument portions of false membrane adhering to the posterior surface of the iris may be taken away, but their removal often endangers the lens; for this reason, and also because the lens pressing on the iris may add to the risk to which such an eye is exposed, Von Graefe advises the removal of the lens in addition to an iridectomy by means of the following operation:—

Graefe's
operations;

the re-
moval of
the lens.

He makes the flap, if the condition of the cornea permits it, downwards, avoiding, if possible, to wound the iris; but if the latter is greatly bulged forward, he passes the knife boldly through it, and in the latter case the capsule is already sufficiently divided to permit the ready egress of the lens. If this is not the case, or the iris has remained untouched, he introduces a pair of straight forceps or a hook, and removes or tears as much of the iris and membrane as is necessary to permit the exit of the lens. After the operation a compress is to be applied, firm at first, and then afterwards somewhat looser. There is generally only very slight reaction, so that the patients for the most part only want to remain in bed for a day or two, and five to seven days in a darkened room.

In some of the cases the condition of the iris begins to improve after the lens has been removed. The anterior chamber becomes wider, and some patients have a little better perception of light. In many cases the ciliary neurosis is also much diminished. For bleeding into the anterior chamber, a soft compress is best; sometimes the absorption of the blood may take as long as two to three weeks.

The iridec-
tomy.

A month or six weeks after the extraction the iridectomy is to be made. Von Graefe makes a large linear incision, passes a large sharply-pointed hook perpendicularly through the tract of the membranes. If on traction of the hook a clear black pupil of mid-dling size becomes apparent, and vitreous humour penetrates into the anterior chamber, he considers the dilaceration as sufficient. If this is not the case, a blunt hook or a straight pair of forceps should be introduced and the opening enlarged. The same will be necessary if a secondary cataract appears in the newly-made pupil. After this operation the cornea

becomes plumper, and may re-acquire a good amount of curvature.

At first he was afraid that the pupils might in such cases close again, but this is fortunately not the case, and these instances form in this respect a most striking exception to those in which an iridectomy has been made without the previous removal of the lens.

SYMPATHETIC IRIDO-CYCLITIS, or inflammation of the ciliary body, sometimes called "sympathetic ophthalmia," is another form of irido-choroiditis, and appears to be the result of morbid irritation in a diseased eye, conveyed by means of the ciliary nerves to the sound eye, inducing a disposition to congestion and the inflammatory proliferation of the tissues in the latter. This most dangerous and insidious form of disease is commonly induced by lesions in one eye keeping up persistent irritation; as, for instance, the irritation and irido-choroiditis brought about by a depressed lens, or a penetrating wound of the sclerotic involving branches of the ciliary nerves in its cicatrix. Synechia, however, alone is capable of keeping up so constant an irritation in one eye as to excite sympathetic irido-cyclitis in the other eye. Nor is it by any means in the active stages only of disease that the one eye thus injuriously affects the other: it often happens that a globe apparently atrophied and destroyed still remains sensitive, and is perhaps subject to recurrent paroxysms of pain; in cases of this description it is by no means rare to see sympathetic irido-cyclitis set up in the other eye. We have always to bear in mind the fact, that an eye impaired by certain forms of disease or accident may exercise, through what we call sympathetic nervous agency, a most pernicious influence over the sound eye. Often in-
sidious.

We may conveniently describe the form of disease we are now considering under two heads—serous and parenchymatous irido-cyclitis.

1. *Serous Irido-cyclitis*.—In the early stages of serous irido-cyclitis, probably the only symptom of which the patient complains is dimness of vision; everything appears as though seen through a mist, and these symptoms are more marked in a dim light, as, for instance, after sunset; in fact, so prominent a

Symptoms,
when pro-
gress slow;

feature is this of the complaint that it is sometimes mistaken for night blindness. As the disease advances, the patient complains of opaque bodies floating about before his eyes. These symptoms depend on haziness and subsequent fluidity of the vitreous humour. There may be little or no pain in the eye, and the sclerotic zone of congested vessels may be wanting. The pupil responds but slowly, if at all, to the stimulus of light, and frequently takes a considerable time to act, on the instillation of strong mydriatics.

when acute.

In other cases the serous effusion takes place rapidly, and under these circumstances the intra-ocular pressure and tension of the eyeball being suddenly augmented, the patient experiences great pain in the eye and corresponding side of the head; the sight for the time being is almost completely destroyed. In these acute cases the posterior layer of the cornea becomes hazy, its epithelium degenerating into opaque, flocculent-looking masses, giving the cornea a speckled appearance; the haziness is often so dense that the fibrous structure of the iris cannot even be seen through it.

2. Paren-
chymatous
irido-
cyclitis.

2. Parenchymatous Irido-cyclitis is more frequently met with as a result of morbid action in a diseased eye propagated to a sound one, than the serous form above described; and I cannot too strongly impress the fact, that the invasion of this most destructive affection of the eye is often very insidious. The diseased organ is probably complained of from time to time, more as an annoyance than as causing any great pain or inconvenience to the patient; it is perhaps tender on pressure, and neuralgia of the brow and temple is now and then experienced. Under these circumstances, it may be without the patient suffering any pain in it, we notice a slight amount of subconjunctival injection in the hitherto sound eye, and on close examination find the iris is discoloured, and its fibrous structure indistinct; it does not respond sharply to the stimulus of light, and the anterior chamber is perhaps diminished in depth. In other cases, besides these signs of trouble in the iris, the patient complains of pain in the eye, especially if pressure is made over the ciliary region, photophobia, lachrymation, and supra-orbital neuralgia. After a short time the pupil ceases to respond to light; and on atropine being

Symptoms
often slight
at first.

Signs of
iritis.

dropped into the eye, we find posterior synechia has already formed, and this, rapidly increasing, glues the iris down to the capsule of the lens, the pupil being frequently closed by neoplastic growths, which may assume a yellowish colour. Corresponding changes occur in the stroma of the iris and choroid; their fibrous structure becomes atrophied and destroyed. The lens and vitreous participate in these degenerative changes, and the eye in too many cases is hopelessly and irrecoverably destroyed. Synechia.

There is another class of cases which we not uncommonly meet with in practice, of a milder nature than either of those above described; in fact, they may be called rather "sympathetic irritation" than sympathetic irido-choroiditis. In these cases, from injury or disease, a patient loses one eye totally or in part. It may be that he suffers no pain or irritation in the damaged eye; but from time to time, from overwork, or overfeeding, very probably the two combined, with excessive smoking, the sound eye becomes irritable and congested, the subconjunctival zone of vessels is injected, there is intolerance of light, and an aching pain over the brow, these symptoms being augmented by using the eye. The tension of the eyeball is normal, and the pupil responds to the stimulus of light. After a few days' rest, and perhaps a little judicious starving, the eye resumes its normal appearance, and functions, and the patient continues his work as usual. Atrophy.

These cases are to be distinguished from sympathetic irido-choroiditis, in that they may continue for years without inducing any further ill consequences; but if we find in addition to these troubles that the patient has tenderness over the ciliary region of the sound eye, the tension of the globe being increased, and that his vision is becoming impaired—it may be only slightly hazy—and the accommodation less sharp than heretofore, perhaps the pupil also acting sluggishly, then we have no longer to deal with sympathetic irritation, but with irido-choroiditis in its early stages, and our prognosis even then will be a grave one in proportion to the advance made in these symptoms before the patient comes under our observation. Symptoms.

Causes.—I have already observed that sympathetic irido-choroiditis most frequently arises from the presence of a foreign body, such as a piece of a gun cap, or Less dangerous.

Foreign
bodies.

some such hard substance, in one eye, exciting sympathetic hyperaction in the other eye through the influence of the ciliary nerves. Among these causes we must not overlook one too common in India—a dislocated lens, thrust down upon the ciliary processes by native “malls” in their operation for the cure of cataract. It would be well in these cases if the injured eye were destroyed entirely by suppuration, for an eye destroyed by abscess of the globe seldom excites sympathetic irritation in the other eye. This fact is accounted for by the assumption that in abscess of the globe the ciliary nerves or their terminal branches being destroyed *in toto*, they can no longer be a starting-point of hyperaction in the other eye.

Wounds.

Foreign bodies, however, are by no means the only cause of sympathetic irido-choroiditis; injuries of one globe, such as an incised wound of the sclerotic and choroid, as cicatrization proceeds, may involve some of the branches of the ciliary nerves and so set up sympathetic irritation. Staphyloma of the iris may in like manner induce this dangerous form of disease. Finally we must bear in mind that internal inflammation of an eye, however induced, is always a likely source of sympathetic irritation if accompanied by continued tenderness over the ciliary region of the diseased globe.

Inflamma-
tion.Prognosis.
Mostly un-
favourable.

The Prognosis of sympathetic irido-choroiditis is always most unfavourable, although in its early stages the removal of the diseased eye may possibly save the sound one; but when once structural changes have occurred in one eye consequent on irritation going on in the other one, we can have but little reasonable hope of saving the second eye. As a general rule, sympathetic disease spreads from an injured or diseased eye to the other one within a period of a few weeks or months, but it may happen that years pass over before this dangerous affection is called into activity in the second eye, or that it becomes so far advanced as to attract attention, and it is then very probably too late to remove the diseased eye. The operation of removal may be followed by temporary relief under these circumstances, but cannot be at all depended upon for the arrest of the abnormal action in the second eye.

Treatment.

Treatment.—I have in the above remarks, so repeatedly observed that the disease we are now consi-

dering has its point of departure in a diseased or injured eye, that we can readily understand the necessity of removing a diseased globe under these circumstances. As a general rule, therefore, the sight of one eye having been destroyed, and symptoms of hyperaction arising in the other, we should at once recommend the excision of the diseased globe (p. 76). Nevertheless, we cannot even then assure the patient that the disease will not progress in the other eye. It is the proper treatment to adopt, but by no means a specific against further mischief, and almost useless if structural changes and tenderness over the ciliary region have set in in the second eye.

Early exci-
sion of
diseased
eye.

The treatment of the eye in which disease has been established by sympathetic irritation is most unsatisfactory. We should endeavour to keep the pupil fully dilated with atropine, and the eye should be maintained in a state of perfect rest, the patient remaining in a dark room, and partaking only sparingly of food. By a soothing plan of treatment we may hope to quiet down the inflammatory attack from which the patient may be suffering, at any rate for the time being; but recur it is almost certain to do, and each attack adds to the damage already inflicted on the eye. Nor can we with any confidence fall back upon an iridectomy in instances of sympathetic irido-choroiditis; in the early stages of the disease it may perhaps be attempted, but I fear with but little hope of relief; in the latter stages the iris becomes so rotten, and firmly glued down to the capsule of the lens, that it breaks away when seized by the iridectomy forceps, and it is useless therefore attempting the operation.

Atropine
and Rest.Iridectomy
seldom
avails.