

With regard to the complications that may occur after this operation, I would refer the reader to the observations already made under the head of flap extraction; they are to be treated in precisely the same way, and I need not therefore reiterate the remarks I have already made on the subject.

LINEAR  
EXTRAC-  
TION.

Gibson's  
operation

only appli-  
cable to  
soft cata-  
ract.

The trac-  
tion opera-  
tion.

The sec-  
tion.

**LINEAR EXTRACTION.**—The operation of linear extraction has undergone various modifications, and is now hardly to be recognised under its old name; it is, in fact, generally described as the Traction operation.

**Gibson's Operation.**—Linear extraction, as described by Mr. Gibson, is a proceeding which is seldom resorted to at present. It consists in dilating the pupil and lacerating the capsule with a needle, as if operating for solution—only the capsule must be more freely incised. The aqueous, in consequence, gains access to the lens, and renders its already degenerated fibres still softer. Some four or five days after the needle operation, an incision is to be made through the cornea, so as to allow of the introduction of a curette into the anterior chamber; the instrument being now turned edgeways, so as to open the wound in the cornea, the soft lenticular matter escapes, together with the aqueous, from the eye. It will be evident that this operation can only be employed in instances of soft cataract; and even then it is attended with considerable danger, in consequence of the irritation that may be set up from the pressure exerted by the swollen lens in the eye, or from small pieces of cortical matter which may be left attached to the iris.

**The Linear or Traction Operation,** as described by Messrs. Bowman and Critchett, is performed as follows: \* The patient having been laid on his back, and the stop-speculum introduced, the surgeon fixes the eyeball with one hand by means of a pair of toothed forceps: and, taking an iridectomy knife in the other, makes an opening through the corneo-sclerotic junction at its upper part.

The opening must occupy about a fourth of the circumference of the cornea, so as to allow the introduction of the scoop into the eye. In the case of a

\* *Ophthalmic Hospital Reports*, vol. iv. p. 315.

soft cataract, there will be no necessity to make quite so large an opening as this.

The incision having been completed, a fold of iris is to be excised, as in iridectomy. Should there be any bleeding into the anterior chamber, the curette must be introduced between the lips of the incision and slightly pressed upon the sclerotic edge of the wound. At the same time, the tendon of the inferior rectus must be seized with a pair of forceps, and the eye gently pulled downwards, so as to cause just sufficient pressure to squeeze the blood out of the anterior chamber.

The capsule of the lens is then to be lacerated freely—if possible, as far as the suspensory ligament; but that structure should not be broken through, if it is possible to avoid doing so. If much transparent cortical substance surrounds the opaque part of the lens, Mr. Bowman inserts the point of the pricker into the lens-substance, and then slightly rotates the body of the lens on its antero-posterior axis, so as to loosen it from the capsule. If this is not done, the cataract is very apt to adhere to the capsule.

The lens is then to be removed with a scoop or traction instrument, which is to be introduced through the wound in the cornea, and passed gently onwards between the capsule and the nucleus of the lens. The lens having been secured by the scoop, the instrument is to be withdrawn from the eye, and with it the lens. Any small portions of lenticular matter, which may be left behind in the anterior chamber, are to be carefully removed with the scoop or the suction instrument, and the eye is then to be closed, and a compress and bandage applied over it.

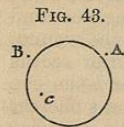
**VON GRAEFE'S MODIFIED LINEAR EXTRACTION.\***—V. GRAEFE'S MODIFICATION. The patient having been placed under the influence of chloroform, the lids separated by an adjustable speculum and the eyeball drawn downwards by forceps applied immediately *below the cornea*, the operation is commenced.

**Step I. The Incision.**—The point of a long narrow-bladed knife, with the cutting edge directed upwards,

\* *Ophthalmic Review*, vol. iii. p. 25.



1. Directions for making the section.



is inserted in the sclerotic, near the upper and outer portion of the cornea, at the point A (Fig. 43), so as to enter the anterior chamber as peripherally as possible. In order to widen the extent of the inner wound, the point should at first be directed downwards and inwards towards C, and then when the blade has advanced about  $3\frac{1}{2}$  lines into the anterior chamber, the point of the knife is to be directed up and along to B, where the counter puncture is to be made; great care must be taken that this point does not lie too far back in the sclerotic. Only when the knife has advanced fully three lines and a half within the visible portion of the anterior chamber should the handle be lowered, and the instrument directed along the scleral border on to B. As soon as the resistance to the point is felt to be overcome, showing the counter-puncture to be accomplished, whether the uplifted conjunctiva be transfixed or not, the knife must immediately be turned steeply forwards, the back of it being almost directed to the centre of the ideal sphere of the cornea, when the incision is to be continued in this plane: first, by boldly pushing the knife onwards, and then, after its length is exhausted, drawing it backwards. Should this latter movement, though generally sufficient, fail completely to divide the scleral border, the sawing manœuvre must to a less extent be repeated. As soon as the last bridge of the scleral border is cut through, the knife lies freely moveable under the uplifted conjunctiva, which, in order to avoid the formation of too long a flap (the proper height is  $1\frac{1}{2}''$ — $2''$ ), must now be divided by a sawing movement horizontally forwards, or even forwards and downwards.

The Iridectomy.

*Step II. The Iridectomy.*—The holding forceps having been handed to an assistant, with a straight pair of iridectomy forceps, we lift the conjunctival flap of the prolapsed iris; and reflect it down over the cornea, when the prolapsed portion of iris appears perfectly bare. Hereupon, the prolapse of the iris is seized with the forceps at its central and most vaulted portion. It is gently pulled upon, so as to make it present a triangular shape, and excised at its base from one corner of the wound to the other, to which

end usually two slight strokes of the scissors are required, care being taken that little tags of iris are not left involved in the angles of the wound. After excising the iris, we should direct our attention to the position of the sphincter papillæ, and if we find that its angles are curled upwards, or involved in the section, we should press them gently back with the curette, so that the sphincter comes to be in its normal position flat upon the capsule of the lens. If at this stage of the operation hæmorrhage takes place into the anterior chamber, the blood may be evacuated by pressing on the cornea with a soft sponge; in some instances it may be necessary to lift up the corneal flap, and squeeze the blood out of the anterior chamber by rubbing the lower lid on the cornea.

*Step III. Laceration of the Capsule.*—The operator having resumed the fixing forceps, now with a cysti-tome properly bent, and which is armed with a fleam, divides the capsule freely by two or three successive rents, beginning from the lower edge of the pupil, and ascending successively along its nasal and temporal margins near to the upper equator of the lens.

*Step IV. Evacuation of the Lens.*—The mode of evacuating the lens varies, according to the amount of soft surface matter. Where there is plenty of it, the delivery is, as a rule, effected without the introduction of any instrument, merely by external pressure. The back of a broad and moderately arched spoon is, close to the centre of the incision, gently pressed against the sclera, so that the wound is made to gape. Thus, cortical masses are caused to escape, and the vertex of the nucleus presents itself. In order to promote as much as possible the thorough exit of the latter, the back of the spoon is made to glide along the sclera; first, with an equable degree of pressure laterally towards the corners of the wound, and thereupon, withdrawing it from the wound, upwards with a continuous increase of pressure. If during these movements the diameter of the nucleus present itself, the pressure is more and more abated, and the delivery may be completed by applying the end of the spoon to the projecting edge of the nucleus. If there be but a thin stratum of soft cortex, the recommended "slide manœuvre" may likewise be tried, but ought to be

3. Lacerating the capsule.

4. Evacuation of the lens.

By simple pressure, if cortex is soft.



By the use of a hook in harder forms.

abandoned as soon as we observe that during the lateral movements no presentation ensues. In this event, the hook must be resorted to, which in the case of hard cataract is required *ab initio*. The blunt hook which Von Graefe was in the habit of employing has the form represented in

Fig. 44. Fig. 45.



Modification.

Fig. 44, and has its stem bent in such a manner as to enable it to be readily pushed under the nucleus. It is first laid flat on the opening made in the capsule: thereupon drawn back over the near edge of the nucleus, when, by a suitable elevation of the handle, it is brought in the direction of the posterior cortex, along which it is then pushed forward on the flat, until it has passed the posterior pole of the nucleus. The instrument is now between the fingers rotated around its axis, so that the plane of the curved extremity of the hook exchanges its horizontal for the vertical position; or should resistance be felt, an oblique one; and the nucleus, or as the case may be, the whole lens, is by a gentle traction carried towards the incision.

Von Graefe more recently strongly advocated the removal of the lens by pressure on the lower portion of the cornea with a vulcanite curette. The eye being fixed by means of a pair of forceps holding a fold of conjunctiva below, and to the inner or outer side of the cornea, the curette is placed along the lower margin of the cornea, and pressure made backwards and upwards as in ordinary flap extraction, the same precautions being taken as I have already described when considering the older operation.

5. Removing cortical fragments.

*Step V. Clearing of the Pupil, and Coaptation of the Wound.*—Von Graefe adds, if, as happens in the majority of cases, after extraction of the nucleus, cortical masses remain, they must be evacuated by gentle pressure and friction, exercised with the finger-ends through the medium of the lids, and in accordance with the well-known rules for the same purpose observed in flap extraction. Only in exceptional cases

may a small spoon be introduced for the removal of isolated cortical fragments, which may be partially adherent to the capsule. Very delicate coatings of the capsule, if their evacuation be difficult, are better left behind; but, on the whole, as complete a removal as possible of the cortex should be insisted on. Finally, Closing the wound is to be cleared with forceps from any adherent iris, pigment, or coagula, and the conjunctival flap replaced in its proper position.

Regarding the *after-treatment*, I may be brief. The usual compressive bandage must be applied, and first renewed five or six hours after the operation, afterwards twice (or even once) a day. In regard to light, the habitual cautions must be observed. Rest is to be recommended, but less rigorously than after flap extraction. If necessary, the patient may pass even the first days following the operation out of bed. Respecting the diet, everything may be allowed excepting stimulants and such aliments as require mastication. From the second day I apply atropine (usually twice a day), chiefly to prevent coalescence of the two corners of the sphincter with the capsule. Only where copious conjunctival secretion either existed before or became apparent after the operation, I defer the application. If anything untoward occurs, a cautious yet accurate examination (always by artificial light) must decide whether it originate from the wound, the cornea, the iris, or the capsular cells, when the proper measures have to be taken in accordance with the customary rules. With reference to the section, Mr. G. Lawson and other surgeons who have extensively practised Von Graefe's operation, advise that the line of incision should commence at a point corresponding to the upper edge of the pupil, the section being made entirely in the cornea; and that only a small piece of the central portion of the iris should be excised.

LIEBREICH'S OPERATION FOR CATARACT.—The following is Mr. Liebreich's description of his operation:—

The incision of the cornea is to be made with the smallest possible Graefe's knife in the following manner.

Puncture and contra-puncture are made in the sclerotic about one millimetre beyond the cornea, the whole remaining incision passing with a very slight



curve through the cornea, so that the centre of it is about one millimetre and a half distant from the margin of the cornea. This incision can be made upwards or downwards, with or without iridectomy, and the lens can be removed through it with or without the capsule.

If, as I now practise, the extraction is made downwards without iridectomy, the whole operation is reduced to the greatest simplicity, and does not require narcosis, assistance, elevator, or fixation; and only two instruments—namely, Graefe's knife, and one cystitome, with Daviel's spoon.\*

TAYLOR'S OPERATION FOR CATARACT.—The special object of this operation is to extract the lens through a peripheral section of the iris without injuring the pupil.

The following is Mr. C. Bell Taylor's account of his operation:—

The instruments I employ are a pair of sharp forceps that pierce the sclerotic; a very light speculum (a modification of Von Graefe's); and two knives, a line in width, and bent at an angle similar to the ordinary iridectomy knife—one with a sharp point, the other with a blunt or bulbous extremity.

Having separated the lids with the speculum, the eye should be gently turned downwards with a pair of ordinary forceps in the operator's right hand. Having got the globe into a favourable position, it should be fixed by the sharp forceps at about the junction of the upper with the middle third of the cornea; the pointed knife is then entered in the corneo-sclerotic junction one or two lines from the forceps at the summit of the cornea, pushed well into the anterior chamber, and then with a gentle sawing motion carried along the summit until about one-third of the cornea has been incised. The capsule is then carefully divided with Von Graefe's cystitome, having been previously rendered tense, and the eyeball fixed with a pair of ordinary forceps. It is better to open the capsule at this stage, because bleeding from the wounded iris—and conjunctiva also—at a later period is apt to fill

\* *British Medical Journal*, Dec. 2, 1871.

the chamber and render this part of the operation obscure and difficult. The upper segment of the iris is then seized, and a small piece of the periphery only excised, the pupillary margin and portion of iris attached to it being left untouched and free in the anterior chamber; the lens is then extruded through the gap in the ordinary way, gliding behind the pupil, so that there is no stretching of the sphincter.

In this way I believe that I have secured all the advantages, in the way of safety and certainty, of an associated iridectomy (which I have already detailed), and at the same time attained that grand desideratum—a central and moveable pupil.

SELECTION OF AN OPERATION.—We may now pass on to the consideration of the circumstances which would probably lead us, to select either one or other of the operations described for the removal of a cataract.

With regard to the operation of reclinatio, there can be no doubt that by far the majority of surgeons of the present day have discarded this proceeding altogether; nevertheless, Professor Quaglino, of Pavia, has lately been operating by reclinatio with success, and he thinks that we have abandoned this operation without good cause.\* Professor Quaglino remarks, that the most permanent and brilliant results of depression are obtained in the case of cataracts which are either soft or cheesy in consistence, in the fluid ones among middle-aged people, and in those which occur in infancy. In hard, senile cataracts it may be adopted, but more exceptionally. Evidently, therefore, the best results follow in precisely those cases which succeed best either by linear extraction, the suction operation, or solution; and my own experience certainly leads me to prefer any one of these means of removing a cataract to that of reclinatio. I may, however, refer to the practice of other surgeons in this respect. Dr. J. T. C. Ross has probably had as much experience, and operated as often for reclinatio as most surgeons in India, and he tells me that fifty per cent. was above the average of cures

CHOICE OF AN OPERATION.

Recent revival of reclinatio.

Doubtful advantages.

\* A Clinical Lecture by Prof. A. Quaglino on Sclerionix: *Ophthalmic Review*, Oct. 1867, p. 374.



in his practice among patients such as those described by Professor Quaglino as presenting the most favourable conditions for reclination.

Danger of the operation.

The native Huckeems and Kobrages always operate for the cure of cataract in this way, and hardly a week passes that some of their patients are not seen at the Calcutta hospital, suffering from either inflammation of the choroid, or from retino-choroiditis. Here, at any rate, we have warning sufficient to prevent our resorting to this proceeding.

Advantages of solution.

The operation for solution of cataract is a most valuable one, but the great drawback to it is the length of time it often takes to cure a patient by this means; and the risk run from the contact of detached pieces of the lens resting on the iris, and exciting more or less inflammation in this delicate structure. Solution is, of course, most applicable to instances of soft cataract, occurring in persons under thirty-five years of age, or before the nucleus has fully formed. If in a case of this kind, the sight of one eye is almost destroyed by a cataract, and the other eye is beginning to get dim, most surgeons would select the operation of solution as being the one likely to yield the best results, the worst eye, of course, being operated on.

Too tedious for the poor.

This rule, however, is more applicable to the case of private patients than to those in hospital, because the latter class can ill afford the time necessary to complete the cure, particularly if they come from a distance, and cannot consequently attend as out-door patients. Nevertheless, I find from the Moorfields Hospital Reports, that in 1866, of three hundred and forty-one cataract cases operated on, not less than ninety-nine were treated by solution; this is a fair criterion of the high estimation in which the very able surgeons in charge of the Moorfields Hospital hold the operation. I cannot say that in my own practice I operate by solution in nearly the same proportion of cases, preferring, even in soft cataracts, to remove the lens in its capsule.\*

V. Graefe's method in hard cataract;

In the majority of cataracts, however, the nucleus is hard and therefore effectually prevents our operating for solution; we have consequently to determine whether

\* "Contributions to Ophthalmic Therapeutics." By Robert Brudenell Carter. *Practitioner*, March, 1871.

we perform the old flap extraction, Von Graefe's operation, or one of the modified forms of extraction which I have described. In coming to a conclusion upon this point we must take into consideration the circumstances of the patient. Among the low-feeding population of India we are very apt to get sloughing of the cornea, and I think, as a rule, less likely to have inflammation of the iris induced by a slight amount of injury than is the case amongst Europeans; nevertheless it may probably be laid down as a rule that in senile cataract it tends to success if a portion of the iris is excised immediately before the lens is taken out of the eye, as in Von Graefe's operation; in fact, the prevailing opinion among ophthalmic surgeons of the present day is that there is no operation which affords a patient affected with senile cataract a better hope of recovery than Von Graefe's method of removing the lens;\* and I most certainly concur in this opinion, provided it is found that the patient's pupil does not fully and quickly dilate under the influence of atropine; but if the pupil does act thoroughly after atropine has been employed, I am of opinion that we should remove the lens in its capsule; at any rate I am not disposed to excise any portion of the iris if the pupil is well dilated and cannot thus hinder the passage of the lens from the eye.

In the mixed or cortical cataract the majority of and in cortical. surgeons would prefer to operate by Von Graefe's proceeding rather than by modified linear extraction; nevertheless my own success has been so great in instances of this kind by the employment of the operation I have described at page 508, that I cannot but advise to give it a fair trial. In Europe, with the advantage of skilful assistants to help at the time of the operation, and good nurses to attend to the patient afterwards, we might prefer Graefe's operation in cases of cortical cataract, but in India we seldom have these advantages and have to depend mainly upon ourselves for success. We shall be called upon to operate very often on comparatively young people, say from forty-five to fifty years of age, and in instances of this

Or the author's modification.

\* "On Extraction of Cataract." By H. Wilson, St. Mark's Hospital, Dublin. *Dublin Quarterly Journal of Medical Science*, May, 1870.



description I have gained most satisfactory results by means of modified linear extraction, seldom finding it necessary in cases of this kind to excise a portion of the iris.

Mr. H. Cayley, of Calcutta, has lately written on this subject. He remarks that during the year 1874 (excluding cases of soft cataract) he operated on 135 cases of hard or mixed cataract: of these thirty-eight cases were operated on by Graefe's method, "twenty-nine were successful, leaving the hospital with good sight. This gives nearly 77 per cent. of cures." "The cases of Macnamara's operation gave the following results. The total number of cases was 97, of which 84, or nearly 87 per cent. were successful; in three cases iritis set in, from which the patients recovered with a fair amount of sight; in 53 of the 97 operations, the lens and capsule came out entire, and only one of these went wrong; this patient was suffering from chronic bronchitis, and a violent fit of coughing caused hæmorrhage into the vitreous chamber."\*

Zonular  
cataract,  
operations  
for.

Iridectomy, again, may be useful in instances of zonular cataract, provided we find its centre opaque, and the outer part of the lens free from striæ or opaque dots. Under these circumstances we may fairly assume that the opacity in the lens will not advance, or if it make any progress that it will do so very slowly; and it will then be advisable, either by means of an iridodesis or an iridectomy, to open a passage for the rays of light to the retina, through the transparent part of the lens; it is evidently far better to leave the lens *in situ* if possible. But supposing that, from the presence of striæ and spots, together with increasing impairment of vision, we have evidence of advancing changes in the lens, it is then advisable to open the cornea by means of a linear extraction knife, and so to withdraw the lens from the eye with the help of a scoop.

Extraction  
of opaque  
membrane.

In cases where a soft cataract has in part become absorbed, leaving a deposit on the inner surface of the wrinkled capsule, I usually open the cornea, pass a pair of iridectomy forceps into the eye, and seizing the opaque membrane withdraw it at once. The pupil must be kept fully dilated with atropine, and the com-

\* "Notes on Operation for Cataract." By Surgeon-Major H. Cayley. *Indian Annals*, July, 1875.

press and bandage applied as usual after these operations.

As I before remarked, we sometimes meet with instances of cataract complicated with synechia. Before attempting any operation in these cases, we must endeavour carefully to ascertain what amount of vision the patient possesses, by moving a bright light before his eyes; if he is unable, even in a dark room, to see the flame of a lamp, it is seldom that we can do good by means of an operation; for the chances are, that although we remove the opaque lens, the retina will have been so far involved as to prevent our patient's benefiting much by the extraction.

Cataract  
complicated  
with  
synechia.

In operating in instances of cataract complicated with synechia, we should first perform iridectomy, and then remove the lens with a scoop, or Bowman's traction instrument.

Treatment  
of.

CAPSULAR CATARACT.—One of the varieties of capsular cataract with which we have to deal, is that which occurs after the removal of an opaque lens. The patient may have made a good recovery from the operation, but still complains of dimness of vision; the cause of this will probably be detected on dilating the pupil, and examining the eye by the lateral method of illumination, when a slight film may be seen extending behind the pupil, occasioned by an opaque layer formed on the inner surface of the capsule, which had not been entirely removed at the time of the operation. The epithelial cells produce a kind of abortive lenticular matter, or it may be that neoplasms grow from them, rendering the inner surface of the remains of the capsule more or less opaque.

Capsular  
cataract  
after ex-  
traction.

Capsular cataract, again, may occur after iridochoroiditis, and inflammatory affections of the deeper structures of the eye. In these instances we shall at once understand the nature of the case, from the presence of complications such as exist after iritis: synechia, loss of brilliancy in the fibrous structure of the iris, immobility of the pupil, and so on. In these cases the epithelium lining the capsule appears to become involved in the hyperplasia, and neoplasms are formed, which becoming organized induce capsular cataract, and very probably subsequent degeneration and opacity of the lens substance. Capsular opacities of this kind are often star-shaped, the most central

After in-  
flamma-  
tion.

From  
changes in  
the epithe-  
lium.



portion looking chalky, and shading off towards the circumference of the lens.

From  
external  
deposits.

Lastly, capsular cataracts may occur from the formation of neoplasms (the result of iritis) on the anterior surface of the lens (capsule). In this case the neoplastic formations are simply deposited on the capsule, and becoming organized, give rise to an opacity, which is generally complicated with extensive synechia, if not with closed pupil. Organized deposits may likewise form on the anterior surface of the capsule in instances of suppurative keratitis, the formation originating in the cornea, and being subsequently deposited on the lens. And lastly in instances of purulent conjunctivitis among infants, the cornea may ulcerate, the lens is forced forwards against the ulcer, neoplastic formations form on its capsule, then the ulcer heals, and the lens returning to its normal position retains the opaque formation it received when in contact with the cornea.

Treatment.

Considerable care is necessary in operating upon capsular cataracts which have formed after the removal of the lens; all irritation must have subsided in the eye before any attempt is made to break down the opaque capsule, and it is hardly likely, therefore, that we shall be able to operate under a period of two months from the date of the extraction.

False cata-  
ract after  
extraction.

The most simple plan of destroying these opaque bands is to pass a needle through the cornea, the instrument having a cutting edge, so that we may be able to divide the opaque capsule with it. The patient having been placed under the influence of chloroform, and laid on his back, a stop-speculum is to be adjusted, and the eyeball fixed, an assistant seizing a fold of the lower part of the conjunctiva with a pair of forceps. The surgeon then passes the needle through the cornea, and behind the capsule, so that it may be made to cut an opening through, or break down the opaque membrane; there is no necessity for passing the needle deeply into the vitreous, our object is simply to "comminute it (the opaque membrane) without any drag on the contiguous parts, either of the capsule or iris."\*

Operation  
with one  
needle.

\* Bowman on Capsular Obstructions: *Ophthalmic Reports*, vol. iv. p. 364.

It often happens, however, that the opaque membrane or band yields to the needle, so that it is impossible to break it through; under these circumstances a second needle is to be introduced through the cornea, at a point nearly opposite the first one, and the extremity of one being passed behind, and that of the other in front of the opaque band, the needles are made to rotate round one another, so as to tear down the capsule.

Use of two  
needles.

In some cases the pupil is completely closed by the remains of the capsule, and neoplastic elements resulting from secondary iritis. The communication between the anterior and posterior chambers being thus cut off, glaucomatous changes are apt to occur in the eye, indicated by supra-orbital pain and increased tension of the globe. In cases of this kind, whether complicated with glaucoma or not, it is most advisable that a portion of the iris should be excised, and the opaque membrane which adheres to it removed. I think it is better at once to resort to an iridectomy in these cases; or to follow the practice advocated by De Wecker, which consists in making an opening sufficiently large in the cornea to allow of the introduction of the blades of his forceps scissors into the eye, one blade of this instrument is passed through and behind the iris and exudation mass, the other blade along the posterior surface of the cornea. With one or two incisions a portion of the iris is removed, but in some instances on making a single cut through the false membrane and iris, the edges of the wound retract to such an extent as to leave a very good opening for the passage of light into the eye.

Closed  
pupil.

Treated by  
iridec-  
tomy.

The after-treatment in these cases of capsular cataract, consists in keeping the pupil as fully dilated as possible, and the eye at rest by means of a light pad and bandage; it is also advisable to confine the patient to a dark room, until all signs of irritation have passed away from the eye.

After-  
treatment.

TRAUMATIC CATARACT, whether arising from an accident, or following an operation involving the lens, will generally vary according to the size of the opening made in the capsule, and the age of the patient.

TRAUMATIC  
CATARACT.

If only a small opening is made in the capsule of the lens, a portion of its cortical substance may pro-



A small wound may leave few traces.

If larger, some opacity.

In severe wounds,

Lens swollen and opaque.

Sets up inflammation.

Traumatic cataract from a blow.

Diagnosis easy.

lapse through the wound, undergo fatty degeneration, and become absorbed; the edges of the wound in the capsule then fall together and unite, and a small cicatrix alone remains to mark the site of the original injury.

If the opening is more extensive, the aqueous finds its way between the capsule and the cortical substance, and produces opacity of the latter. Unless the lens is injured the opacity may be superficial; neoplasms may form round the edges of the wound in the capsule, which may close, and the epithelial cells remaining intact, much of the original transparency of the lens may return.

Lastly, if the capsule be extensively lacerated, and the aqueous has free access to the lens, degenerative changes make rapid progress in the lenticular matter, which is soon rendered opaque throughout its whole extent. During these changes the lens becomes swollen, and by the pressure it exerts on the iris, may set up considerable irritation in the part, very probably leading to irido-choroiditis, and by sympathetic action too often involving the other eye. In other cases, the pressure of the swollen lens on the parts around induces much congestion of the choroid, and may lead to glaucomatous changes in the eye. The risk of complications of this kind is much increased, if any portion of the lens fall forwards into the anterior chamber; for by coming in contact with the anterior surface of the iris, it greatly increases the irritation going on in the eye.

It by no means always happens that traumatic cataracts are the result of incised wounds of the capsule; sometimes the capsule is ruptured from a blow on the eye, usually near some part of its circumference, and the aqueous, finding its way into the lens, causing a traumatic cataract.

A mistake can hardly be made in diagnosing traumatic cataract: the patient's sight has probably been perfect up to the time of receiving a blow or injury on the eye, and on examining it we find that the lens is opaque. It is impossible, however, to predict the nature and extent of the complications which may occur in the choroid or retina, especially in instances of traumatic cataract following blows.

Foreign bodies, in some few instances, have been

known to pass into the substance of the lens, and without exciting any very great irritation, have induced partial fatty degeneration and softening of the lenticular matter, and then fallen forwards into the anterior chamber. In cases of this kind it may not be possible to see the foreign body in the first instance, on account of the opacity of the lens-substance around it. But instances of this description are very rare: far more commonly a foreign body in the lens gives rise to a traumatic cataract, and usually to intense inflammation of the iris and deeper structures of the eye, which, unless relieved, may terminate in abscess of the globe, and very probably in sympathetic irido-choroiditis in the sound eye.

*Treatment.*—If but a small opening has been made through the capsule, it will only be necessary to dilate the pupil, and keep the eye at rest with a pad and bandage; the parts may recover themselves in the course of time, a minute cicatrix alone remaining to indicate the seat of the injury in the capsule.

If the damage done to the eye has been more severe, for the first few days perhaps after the accident, the anterior chamber will be found full of blood; and when this has become absorbed, the lens will be found opaque; but as I have before remarked, we shall then be unable to ascertain the nature of any complications which may have occurred behind the opaque lens. In these cases atropine must be applied to the eye, and the parts kept perfectly at rest for a few days.

If inflammatory symptoms set in, or have occurred before we see the patient, it is well to administer chloroform, and having first performed an iridectomy, to extract the lens by the scoop operation at once. This proceeding will have to be adopted sooner or later, and in the meantime we run the risk of sympathetic irritation being established in the sound eye, if we allow the injured lens to remain *in situ*. I am aware that in time the irritation caused by a traumatic cataract may subside, especially if the pupil dilates under the influence of atropine; but even in spite of this I am convinced that in the long run, and in the majority of cases, it is better to remove the opaque lens as soon as possible; and doubtless an iridectomy is a most useful and necessary proceeding in this class of cases.

It may happen after an injury to the eye, par-

Foreign bodies in the lens.

*Treatment.*

Atropine and rest.

In case of inflammation remove the lens.

Delay hazardous.



Late opacity from detached choroid.

ticularly among patients suffering from excessive myopia, dependent upon posterior staphyloma, that detachment of the choroid occurs, and that in consequence opacity of the lens gradually supervenes; but in cases of this description we shall have none of the urgent symptoms of irido-choroiditis present, which mark cases of traumatic cataract where laceration of the capsule has taken place; moreover, the opacity comes on comparatively slowly.

Extraction.

The removal of the lens by linear extraction in cases of traumatic cataract requires no particular description, the cataract being extracted immediately after the iris has been excised. Provided the cornea has not been lacerated, nor a prolapse of the iris taken place, complicating the case, we may operate most advantageously through the upper section of the cornea, removing the superior one-fourth of the iris. But if a prolapse of the iris exists, and the injury is a recent one, the protrusion not having become fixed to the edges of the lacerated cornea, it is well to excise a portion of the iris, including the prolapse; by so doing, we not only secure the advantages of the iridectomy in the extraction of the lens, but also adopt the best means for curing the prolapse. For instance, suppose that a wound has been made through the outer part of the cornea, and the iris drawn into it, and that the capsule having been ruptured, a traumatic cataract exists with symptoms of intense irido-choroiditis, I should, if the case were a recent one (having put the patient under the influence of chloroform) open the sclerotic, and after removing the outer fourth of the iris, proceed at once to extract the lens. We must expect in a case of this kind to lose a considerable part of the vitreous; but this is of little consequence, as we may not only save the injured eye, but prevent the other one from being affected by sympathetic irritation.

Palliative treatment useless.

Palliative measures, such as rest, leeches, atropine, soothing applications, and so on, are recommended by some surgeons in these cases, before resorting to the treatment above indicated; but I have seen so much harm result from waiting, and such admirable results ensue from the operative treatment, that I can safely recommend the latter plan, and invariably practise it myself.

In some cases the lens is not only rendered opaque

from the effects of a blow on the eye, but also partly dislocated, irido-choroiditis also existing. Under these circumstances we must be very careful in operating: the lens will easily slip from the scoop, and fall back into the vitreous chamber. To prevent this accident, it is well first to dilate the pupil as fully as possible, then pass a needle through the cornea, and by means of a gentle drilling motion lacerate the capsule; some of the soft lenticular matter escapes, and the vitreous thrusts the lens forwards against the cornea, and we may then with safety proceed to the iridectomy and removal of the lens, the scoop passing behind it without difficulty.

Management of displaced lens.

DISLOCATION OF THE LENS.—Dislocation of the lens may be either complete or partial; in the former, the lens is forced out of the eye through a wound in the sclerotic or cornea, but in partial dislocation the crystalline remains attached to some portion of the suspensory ligament, and may fall forwards, backwards, or to either side of its normal position in the eye.

DISLOCATION OF THE LENS.

1. *Complete dislocation* of the lens is most commonly caused by a sharp blow, such, for instance, as would be given by a racket-ball, or some such small and hard body. The sclerotic is usually ruptured at its inner and upper part, immediately beyond the margin of the cornea, and the lens escaping through a rent in this situation may be lodged beneath the conjunctiva. An injury causing such a considerable lesion of the eye as this, is always complicated with more or less damage to the iris, which is usually torn from its attachment, to a greater or less extent. Immediately after the accident the anterior chamber is filled with blood, and extensive ecchymosis of the skin and conjunctiva occurs.

1. Complete dislocation.

On examining the eye, the black chasm through the sclerotic will be at once visible, and the lens may generally be recognised by its form and size beneath the conjunctiva. It soon loses its transparency, and then appears as an opaque mass in the situation above indicated. In other cases the form of the lens is lost by compression in its passage through the rent in the sclerotic, and until it becomes opaque, we may be unable to distinguish it from vitreous.

Rent seen in sclerotic.

Lens beneath conjunctiva.



Lastly, the lens may be driven completely through the sclerotic and conjunctiva, and fall on to the patient's cheek.

*Treatment.*  
Remove  
the lens.

Close the  
wound.

2. Partial  
dislocation.

Lens  
variously  
displaced.

May not  
directly  
follow the  
injury.

Lens seen  
moving.

Iris tremu-  
lous.

Dislocation  
forwards:

Appear-  
ances.

*Treatment.*—If the dislocated lens is still to be seen beneath the conjunctiva, it is well to slit open the mucous membrane and remove it. Under any circumstances the rent in the sclerotic should be closed, its edges being brought together with one or more fine silk sutures; the eyelids must then be shut, and kept at rest until the irritation excited by the accident has entirely subsided.

2. *Partial Dislocation of the Lens.*—This accident usually occurs from a blow on the eye or forehead, the lens being partially torn from the suspensory ligament, and displaced either upwards, downwards, or to either side; in some cases it is thrown forwards, and rests partially or completely in the anterior chamber. Under these various circumstances, the patient's sight is more or less impaired, for the dislocated lens not only becomes somewhat hazy, but by bobbing about behind the pupil interferes considerably with the perfection of vision.

It does not always happen that the displacement of the lens immediately follows the receipt of an injury; several days may have elapsed since the accident, when from an effort of coughing or sneezing, the already damaged suspensory ligament is ruptured, and the lens dislocated.

On examining the eye, provided the lens has not been thrust forward into the anterior chamber (the pupil having been dilated with atropine), we shall observe the lens swinging about with every movement of the eye, its structure being slightly opaque, and the black chasm of the vitreous appearing behind that part of its circumference which has been detached from the suspensory ligament. The iris, from the loss of support afforded it by the lens, is tremulous.

If the lens has been dislocated forwards, it may occupy the entire pupil, and remaining almost transparent there may be some little difficulty in detecting the nature of the injury. The "light, however, being reflected by its edges, presents a prismatic or glistening circle within the eye, the iris is pressed back, rendering the anterior chamber larger than natural, and the pupil dilated and motionless."

The following is a case in point:—

W. Matthews, of the E. I. Railway, when a child CASE. received a blow on the forehead, after which his eyes became affected. In the left eye there is no lens, and the eye has been in its present state from the time of the accident: the lens has probably been absorbed. The right eye was healthy to within the last month, when he managed to strike it against a doorpost, and immediately afterwards his sight became much impaired. On his coming to me, I found the right lens dislocated forwards and distending the pupil; it was perfectly transparent, and as the man saw very well with the eye, I did not consider it necessary to remove the lens.

I saw this patient again two months after the accident: the lens was still in the same position, and quite transparent; but as it was evidently exciting irritation in the iris and choroid, I punctured it with a needle, and it speedily became opaque, and was then removed from the eye by linear extraction.