

THESIS

Submitted by,
John Douglas Ross Munro.

April 1894.

Analysis of 100 Cases of injury
to the Eye seen in a General
Hospital in a Colliery District,
with Special Notes on the
treatment of certain Cases -

by
J. D. R. Munro.
(M.B. & Ch. Edin.)



INFIRMARY AND DISPENSARY,
WIGAN.

I hereby certify that John
Donlow Ross - M.D. M.B. C.M.
Edin., has been House Surgeon to
this Infirmary for the past two
years.

Will. Sabersnes

Apr 23rd 1894.

"J. C. L. Supt.

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The Dean of the Faculty of Medicine
Edinburgh University.
—

ROYAL ALBERT EDWARD
INFIRMARY AND DISPENSARY,
WIGAN.

April 18th /94

Dear Sir,

I beg to submit my Thesis, for the degree
of M.D., to the Faculty of Medicine of Edinburgh
University.

I shall fill up the necessary forms &c. as soon
as they are forwarded to me.

I am

Yours obediently

J. D. P. Munro

To the Dean of the Faculty of Medicine -

I hereby certify, that the work of
collecting the cases enumerated in this
Thesis has been done, & the Thesis
entirely composed by myself -
(Signed). John Douglas Ross M.D.

April 18th 1894.

I have divided these cases for convenience into Seven classes - namely:-

1. Injuries to lids & conjunctiva.
2. Injuries to Cornea.
 - a) Resulting in Sloughing Ulcers.
 - b) Not resulting in Sloughing Ulcers.
3. Injuries to Cornea & Lens.
4. Injuries to cornea, Lens, & Iris.
5. Injuries involving the Ciliary region.
6. Injuries to eyeball without external wound.
7. Foreign bodies in eye.

A tabulated list of the cases in each class is given after the notes on their etiology & treatment.

1. Injuries to Lids & Conjunctiva.

Causation - Of the 15 cases of injury to conjunctiva, 7 were due to burns by lime, 3 by hot chips of iron, 1 by chip of steel, 3 by hot cinders & one by caustic - Of these, in 7 there was injury to both cornea & conjunctiva, & in the remaining 8, both the ocular & palpebral conjunctiva were affected.

In 7 cases a good result was obtained

without operation, & in the other eight
some operation was done or advised.

The three cases of Ectropion were the
result of lacerated wounds of the lower
lid & in each of these some plastic
operation was done.

In making some remarks about the
treatment adopted in these cases it will
be necessary to consider the Early & Late
treatment separately. - The methods
adopted will vary considerably, according
to the length of time which has elapsed
between the accident, & the time when the
patient first comes under observation -

1. Early treatment - In cases which
are seen early, we must by some means
try to prevent adhesions forming between
the injured surfaces of the ocular and
palpebral conjunctiva. - First, examine
the eye carefully, to see that the foreign
body which has caused the injury does not
still remain between the lid & the eyeball,
& this must never be neglected, as one
sometimes sees cases which have been
treated for days without the irritant having
been removed. - The eye must be bathed
with a warm antiseptic lotion. Boracic
or Perchloride of mercury, or if the patient

complaints of muscle pain, poppy-head or Belladonna fomentations often give relief.

Besides this, some mild ointment should be applied to the injured parts: either Vaseline or Unguentum Iodoformi (1 part Iodoform to 9 parts Vaseline).

Next, comes the part of the treatment which I especially wish to emphasise, that is, the systematic daily separation of the opposed injured surfaces by a probe, passed at least once daily down to the bottom of the lower conjunctival cul de sac, drawn from one side to the other. This is the part which is usually injured, & by this means we prevent adhesions which would otherwise form as healing goes on, & continue this treatment until the opposed surfaces are healed.

This must seem to every one the common-sense way of treating the condition, but certainly does not seem hitherto to have been systematically employed & believed in.

In the seven cases here recorded where I have done this, it has been with the best results, for in none of the patients who attended regularly, was there any symblepharon resulting, the movements of the eye being free in all directions.

In this way, although we prevent adhesions from forming between the opposed surfaces, we cannot prevent the contraction

which must of necessity, take place during the healing process, just in the same way as it does after a burn on the surface of the body. This contraction slightly lessens the depth of the lower cul de sac, but, unless excessive, does not interfere with the movements of the Eyeball.

Some authors say, that where, as here, we have two opposed surfaces over which the mucous membrane is destroyed, it is essential that they must be covered again by mucous membrane to prevent their reunion - De Wecker says that 'all mere separation of the opposed surfaces will have the inevitable effect, not only of causing fresh union, but also, of further increasing cicatricial contraction'.

Others, Walton for instance, recommend that we should try to get the part healed as quickly as possible, as then one gets less suppuration & fewer bands of adhesion formed.

If the cases are treated as before stated, our object is to prevent any adhesion from forming, & although healing may be delayed, it seems to me a much better principle to act on.

Guist in Paris Journal strongly recommends that cases of line burn of the conjunctiva should be treated by washing the part well

with a saturated solution of cane sugar, which forms a deposit of saccharate of lime. He says that no complication results & that no trace of injury remains afterwards - Of this however I have no experience.

2. Later treatment. First, cases of Symphlepharon. In cases where the Symphlepharon was extensive & where flaps of conjunctiva could not be got from the adjacent parts, after division of the adhesions, I have tried to prevent reunion by passing the probe once or twice daily between the raw surfaces, & have had fairly good results (cases 9 & 11), but of course this method of treatment is not applicable to the same extent as in cases which are seen early. It is impossible to prevent a certain amount of union at the bottom of the cul de sac, but the movements of the eye are more free than before & considerable relief is felt by the patient, as the dragging on the eyeball is relieved.

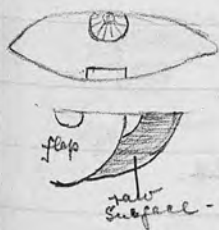
In cases 8, 10 & 13 after dividing the adhesions, a single flap of conjunctiva was dissected from one side & stitched to the bottom of the lower cul de sac - after which it is not a difficult matter to prevent the raw surfaces above the flap from adhering, if the probe is passed down between them daily. & the results in these cases were satisfactory -

This can only be done where we can get a flap of conjunctiva, & the same remark can be made about Taell's operation where we require more conjunctiva still - one flap from each side - but which gives very good results when it can be done -

Transplanting mucous membrane from the inner side of the patient's lip or from animals, has been much tried lately, & sometimes gives good results in cases which do not admit of other modes of treatment.

Certain surgeons have devised operations for extreme cases of symblepharon, based on the principle that mucous membrane can be, as it were, manufactured out of skin by nature -

For instance, Mr Edgar Brown of Liverpool, in an extreme case, takes a skin flap from the lower lid or cheek, slides it up through a slit in the lower lid & stitches it to the eyeball -



This method is not a good one, & in several cases where I know it has been tried the ultimate result was bad. Here, the resulting cicatrix being below, draws upon the lower lid & often makes matters worse than before, & the lump formed takes months to settle down even into a fair shape, while the flap holds the eyeball nearly as tight as the original cicatrix -

Instead of this operation, I would suggest that it would be better if the skin flap

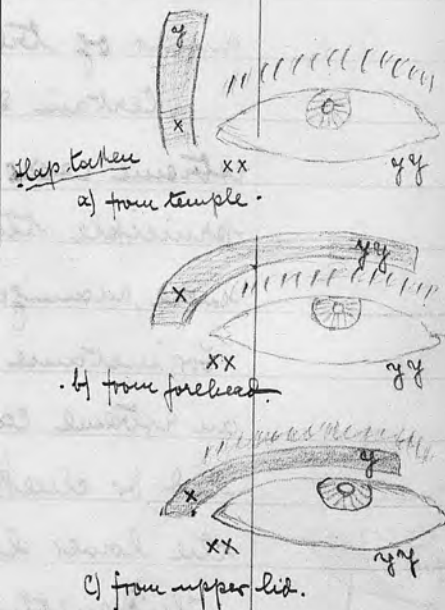
was taken from either the upper lid, temple or forehead, so that the raw surface left does not tend to draw down the lower lid during the healing process. A flap from the upper lid could only be taken when the skin there is loose. The principle of the operation in either of these cases would be the same wherever the flap was taken from, but differ from Mr. Browne's operation, in that the flap is attached to the inner surface of the lower lid, instead of to the eyeball.

The operation would be done in the following way. First, raise the flap (shaded part), then make a slit in the external canthus & separate the adhesions between the lower lid & eyeball.

Now, twist the flap on itself & bring it through the slit in the external canthus, so that its raw surface will be in apposition with the raw surface of the lower lid. Then x comes to xx & y to yy, & the flap is stitched in position by fine sutures.

After adhesion has taken place, say at the end of three or four days, the flap should be cut across near its base, & any part of the base of the flap which is not required there, be restored to help to fill up part of the raw surface from which it was taken.

Skin grafts may be applied to the remainder of the raw surface.



The flaps in these cases have a fairly broad base & good vascular supply - & are almost sure to live - None of these operations should be done except in extreme cases, & must be varied according to the case one has to deal with, but they seem to me to have distinct advantages over Mr. Browne's operation, as before mentioned, & I hope they may be tried when suitable cases present themselves.

As to the three cases of ciatruial ectropion. These were all the results of lacerated wounds of the lower lid - In cases 16 & 17 the eversion of the lid was entirely at the outer end, but in case 18 the central part of the lid was drawn down.

In the two first, a V shaped portion of the whole thickness of the lower lid was removed, & the raw surfaces brought together by several deep sutures -

This can only be done where as in these cases there is plenty of time to spare - & the ectropion confined to the outer part of the lid -

In the third case, a V shaped flap of skin was dissected up, containing the band of cicatruial tissue (which was not extensive) & slid up, so that when stitched in position the wound assumed the shape of Y - The lids were sutured together & not opened for three months - The results were good -



Tabulated list of cases of injury - to lids & conjunctiva -

Sex & Age	Cause	Condition when first seen	Time elapsed since accident	How operative treatment	Operative treatment	Remarks & result
1 Male 40	hot cinder	Burn conjunctiva	1 day	Belladonna fomentations at first - Vaseline ointment - Probe passed daily	nil	Burn over lower inner corner & palpebral portion of conjunctiva. Probe passed daily, but tissue injured surfaces - here & in following six cases - No adhesion when seen 2 months later
2 Male 14	lime	Burn conjunctiva & cornea	14 days	Poppy leaf fomentations - Vaseline - Probe passed daily	-	Cornea opaque when first seen - Slight adhesions easily separated - One year after - no synechia present - & V = fingers out two feet -
3 Male 20	chip of hot iron	Burn conjunctiva	3 -	Corn oil & probe passed daily.	-	No adhesion when discharged or when seen two months after injury -
4 Male 44	mortar	Burn conjunctiva	5 -	Bovine Acid fomentations Unrequentum subconjunctivae Probe passed daily.	-	Burn in lower lids of conjunctiva - No adhesion when seen one week ago -
5 Male 18	lime	Burn conjunctiva & cornea	14 -	Belladonna fomentations Vaseline - Probe passed daily.	-	Lower half cornea injured & conjunctiva below - When seen 6 months later, no adhesion & V = fingers at 4 ft
6 Male 40	piece of hot iron	Burn conjunctiva	2 -	Belladonna fomentations Vaseline - Probe used daily.	-	Lower lids of conjunctiva burnt - when seen 6 weeks after accident there was no adhesion - but depth of lids slightly loosened

No	Sex & age	Cause	Condition when seen	Time elapsed since diagnosis	Time operative treatment	Operative treatment	Remarks & result
7	Male 12	lime	Burn cornea & conjunctiva	7 days	Boric fomentations Irrigation subconjunctival Probe passed daily	Nil	No adhesion when last seen -
8	Male 20	chip of hot iron	Synblepharon, commencing pterygium	4 months	Probe passed daily after operation. Tachline locally.	Adhesion divided.	Adhesion below divided, & apex of pterygium which was just at edge of cornea, separated & settled down to bottom of lower cul de sac. Probe passed afterwards to prevent adhesion above this. Result good. no adhesions.
9	Male 31	hot ender	Synblepharon	3 -	Probe passed daily after operation	Adhesion divided.	Adhesion at lower & outer side - one month after - was much improved. movement of eye free. Slight adhesion at outer part.
10	Male 13	hot chips of steel	Synblepharon, involving lower half of cornea	2 -	Aug. Subconjunctival probe passed after operation.	Plastic operation	After adhesion was divided - a flap of conjunctiva was bisected from outer side, & settled to lower part of raw surface. One settle down way. Slight adhesion formed. To be revisited later on.
11	Male 60	lime	Synblepharon - Staphylococci of cornea	12 -	Probe passed after adhesion divided.	Adhesion divided	No vision - Pain from dragging on eyeball caused by adhesion above cornea - Enucleation advised.
12	Female 9	lime	Synblepharon - opacity of lower half of cornea.	5 -	Aug. Subconjunctival after operation	Scalpel operation.	Synblepharon at outer part. No adhesion after operation - and V = fingers at two feet - one year after - cornea clearing slightly.

No.	Sex & age	Cause	Condition when first seen	Time elapsed since injury	Time operative treatment	Operative treatment	Remarks & result
13	male 30	hot cinder	Synblepharon	6 months	Probe passed after operation	Plastic operation	After adhesion divided. Flap of conjunctiva sutured to bottom of lower, but he saw (as case 8). Probe passed between two surfaces above the flap. Result good.
14	male 18	caustic	Pterygium	7 -	Visible locally	Excision of piece of conjunctiva.	Pterygium enveloping slightly on cornea. Piece of conjunctiva at base of it - excised, & the opposed raw edges left - were sutured together. Pterygium gradually faded & V = $\frac{6}{6}$
15	male 36	lime	Synblepharon Partial ankyloblepharon. Sits other eye. Probably sympathetic.	14 years	Initial treatment		Amelation advised - no vision. Required treatment.
16	male 36	lacerated wound	Ectropion	2 years	nil	(as before described)	Result excellent -
17	male 21	wound by coal	Ectropion	3 months	.	(as described)	Result good.
18	male 47	small lacerated wound.	Ectropion	2 years	.	(as described)	Lids sutured & kept closed for four months after operation. Result good.

2/ Injuries to the Cornea.

A: First, I shall discuss those injuries to the cornea which result in sloughing ulcers, because a large proportion of my cases come under this heading.

The reason for the appearance of cases of sloughing ulcer of the cornea amongst a list of cases of injury to the eye is easily understood, when one remembers that a large number of such ulcers are the result of a traumatism, although we may of course get cases of sloughing ulcer which are not caused thus.

Of the 41 cases of sloughing ulcer which I have tabulated, 28 were the result of injury by chips of coal, 6 by chips of stone, 2 by pieces of wood, and one each by spark from the fire, chip of iron, piece of cement, lime & gunpowder.

In a colliery district like this, such injuries to the eye are very common, but it by no means follows that sloughing ulcers result in all the cases, & it is therefore a question upon what conditions the formation of sloughing ulcers depends.

Predisposing Causes.

1/ Locally. It has been proved that even in a healthy conjunctival sac there exist numerous pyogenic organisms, which are always ready to attack the cornea whenever

an abrasion of the corneal epithelium gives them a chance, & the conditions upon which their success or failure depends are numerous.

In colliers who are much exposed to injuries with foreign bodies, smoke, dust & the like, there is more likely to be some conjunctivitis present, than in those living in districts where they have occupations which expose them less to such irritants, & where the atmosphere is clearer.

Where chronic conjunctivitis is present there is an increase of pyogenic organisms in the conjunctival sac, & in such a case, it is clear that a slight wound of the cornea is more likely to become a sloughing ulcer, than it would be in an eye where the conjunctiva was quite healthy.

After examining the eyes of colliers here, I find that conjunctivitis is less frequent than one would suppose considering their occupation, but it does exist to a slight degree in a fair number of cases, in a chronic state, without troubling them, & is only noticed on carefully examining the eyes.

In most of the cases of sloughing ulcer the condition of the eye was far too advanced when first seen to enable one to tell whether there had been any conjunctivitis before it was injured.

2/ The condition of the Nasal fossae & Maxillary sacs is also affected by the vitiated atmosphere in which colliers work, & even if nothing is complained of by the patient these parts are often in a state of chronic catarrh.

3/ Atmospheric conditions - The atmosphere of the district being always more or less smoky must increase the tendency for an abraded surface to take on an unhealthy action. Dr. Fenton says, that he considers that atmospheric conditions alone do in many cases account for sloughing ulcers resulting from injury, & if we accept this, it to a great extent explains the frequency of these cases in a colliery district.

4/ The temperature down a coal pit is usually about 15° higher than on the surface, ^{varying considerably} & I consider that this higher temperature has a material effect in aiding the action of germs, when there already exists an abrasion of the corneal epithelium.

^{the temperature increases proportionately with the depth of the pit.}
5/ Season of the year. In support of what has just been said is the fact that sloughing ulcers are more common in summer than winter, & this was especially noticeable last summer when the heat was so intense.

6/ General conditions of life. Both the housing & mode of living is bad in a densely

populated district; as to the former, the space is very restricted & ventilation bad, whilst although the food is of fairly good quality, the amount of alcohol taken undermines the constitution of the majority of the men.

Exciting Cause - This in the majority of the cases has been a chip of coal.

On looking over the cases one notices that five of those which went to the bad were seen as early as the average, & these were, with one exception, in eyes which were injured by coal. I believe that the coal itself has some special effect on the cornea, as in other cases thus injured the rapidity with which the ulcer spreads is greater than in cases injured by other foreign bodies.

Treatment of Sloughing Ulcers of Cornea.

So many lines of treatment have been advocated for these cases, that it is evident that no special one has been found really satisfactory, or it would have been more generally adopted. It is only after treating a fair number of cases that one can form any idea as to the real value of any line of treatment, & if therefore in treating about forty cases, fairly

Satisfactory results have been obtained from a method of treatment which does not seem to be well known, it may be of some little use if a few notes are given about the methods employed.

I. Early treatment. Three lines of treatment are to be noted. (a) Eye drops. (b) Cantery, & (c) incision for hypopion; ^{one or more of} which may require to be combined in the treatment of the same case.

(a) First, as to drops. Some years ago, ^{Mr} Williams of Liverpool advocated the local application of Quinine in the treatment of sloughing ulcers of the cornea, & in many cases it seems to have a very good effect when used along with Atropine. These cases are not infrequently complicated by hypopion, & the effect which Quinine has in arresting suppuration, & even in causing absorption of the pus in the anterior chamber, seems to me to have been demonstrated in these cases where it has been used.

Atropine is combined with it on account of the Iritis which is often present, & the drops are made up as follows:-

Rx Quinine Sulph. $\text{gr} \text{ } \overline{\text{iv}}$
Atrop. Sulph. $\text{gr} \text{ } \overline{\text{iv}}$
Aqua distillata 3j
M. ft. gutt.

At first, until the pupil is well dilated & the condition of the eye improving, the drops should be used frequently, often four hourly, or in some cases every two hours for a short time, & as the condition of the eye improves the frequency is lessened to six hourly or three daily. The tension of the eye must especially be noticed when the drops are being used frequently.

It is very doubtful whether Atropine itself has any effect on the formation of pus which goes on in these cases, but Quinine does seem to arrest this in a marked way in many cases. In about half a dozen of the cases collected here, where Atropine drops were first used when they came under treatment, no improvement in the condition of the eye had taken place at the end of twenty four hours, & the hypopion which was present was getting larger. Now, the Atropine & Quinine drops were substituted, with the result that by the next day the eye was looking much better & the hypopion getting less - this improvement continuing until the hypopion had quite disappeared at the end of from two to four days.

For such a favourable result, the case must be seen before the ulceration of the cornea is far advanced, & while the pus in the anterior

chamber is of fluid consistency, for if not, it will require to be let out by some operation, as will be seen later on.

Combined with the local application of Quinine is its internal administration, which has been advocated for many years in this class of case. Whether it acts in any other way than as a tonic one cannot say, but it is quite possible that it may aid the local action of the Quinine, help to combat the suppuration going on in the cornea. Two or three grains is given thrice daily, during the time the patient is under active treatment.

Before mentioning this, I should have stated that the eye is bathed with a warm antiseptic lotion - Boracic or Perchloride of Mercury - each time before the drops are used.

(b) - Secondly - Cautey - In addition to the above treatment it is in some cases advisable to try & prevent the infiltrating margin of the ulcer from spreading, with this object, the actual cautey has been used.

The rapidity with which the ulcer spreads is very marked, & if not arrested, may in a few days lead to destruction of the greater part of the cornea. The shape of the cautey used is shown opposite.

This is heated in the flame of a spirit lamp

& retains the heat for a sufficient length of time to allow its effectual application to the ulcer; but if there is a large surface to be cauterised, the cautery may require to be heated more than once. In applying the cautery, one must attend to certain points if we wish for a good result.

On looking at a sloughing ulcer we see that it has a yellow infiltrating edge & external to this, an outer grey margin. - In the latter, I believe that there are leucocytes and phagocytes which destroy & so limit the action of the organisms in the yellow part; so that in applying the cautery our object should be to destroy the yellow sloughing margin, leaving the greyish part outside it.

Fluorescin, if applied to the eye, stains the ulcerated part deep yellow & the rest of the cornea slightly green, the line of demarcation between the two being well seen; so that, this may be used with benefit, to show us exactly the limits of the ulcer before applying the cautery.

The cautery should also be passed lightly over the floor of the ulcer, & some say that this should be perforated, but I prefer not to do so, although sometimes when the floor is very thin this may happen accidentally. - If active mischief is

going on, the spreading of the margin of the ulcer has not been arrested by other treatment, the sooner the cautery is applied the better. It may require to be applied more than once, & we are guided as to this, by whether the spreading process has been arrested or not. In cases where the pus is let out from the anterior chamber, it is better not to cauterise the ulcer till the next day, when the anterior chamber has been restored.

(In deep ulcers, where the floor is thin & being bulged forward, instead of perforating by the cautery, an opening may be made through it by a paracentesis needle or a small Dissecting Knife, which should be passed obliquely through the cornea, keeping as far away from the lens as possible, & in this way the aqueous humour is let out.)

Reverting to the use of the Cautery, opinions differ much as to the amount of tissue which should be destroyed when it is applied. Mr. Penton says that only a superficial destruction of tissue is necessary to arrest the sloughing, but it certainly seems to me more likely that we shall arrest this if we destroy the whole of the yellow margin where we believe the infective organisms are most active.

Mr. Nettleship advises that for safety the parts should be burned a little beyond the opaque edge, whilst Holby on the other hand objects to the use of the cautery, as he says it only reaches the germs in the tissue destroyed, is apt to do more harm than good by destroying sound tissue -

Instead of the cautery, some prefer scraping the ulcer, but it has not been tried in these cases. Mr. Berry of Edinburgh in 1884 strongly recommended it when combined with the subsequent application of Nitrate of Silver (2-3%), the margins of the ulcer being thoroughly scraped before this is applied -

Dr. Moxon in Lancet (May/91) recommended scraping as being of special value in obstinate cases of serpiginous ulcer, & says that where other methods of treatment have failed it sometimes causes the ulcer to heal up rapidly -

(C) Thirdly - Operative treatment for Hypopion -

Although we see in many cases, disappearance of the hypopion when Atropine & Euphrasia drops are used, we cannot expect this to take place in all, more especially when the case is not seen until late, & when the pus has formed a gelatinous like mass -

Then, we must have recourse to some operative measure - Various methods are employed.

1/ The method employed in these cases

has been to let out the pus from the anterior chamber of the eye, by means of a vertical radial incision in the cornea, as was first recommended by Mr. Williams of Liverpool, of this method I can speak very highly.

This is done by a Graef's knife which is passed into the anterior chamber at the lower margin of the cornea, & carried upwards to opposite the lower margin of the pupil, but not beyond it. Thus, the incision is opposite the place where the pus has collected, & on withdrawing the knife it usually escapes with the rush of aqueous humor which takes place. If the pus has formed a gelatinous like mass, it often sticks between the edges of the wound, & can be lifted out by a pair of forceps.

The advantages of this incision seem to be:-

- a) That all the pus escapes from anterior chamber.
- b) That the wound does not require to be reopened.
- c) That the incision heals by first intention if in healthy tissue. (If the ulcer is low down, the incision must be through part of its floor, & it does not then heal so quickly).
- d) That no prolapse of the Iris takes place, because the radial incision allows



the edges to fall together better. & this also causes less distortion.

- e. Anterior Synechiae are not so likely to form, as when the healing of the wound is delayed by repeatedly reopening it.
- f. The Section being radial, interferes less with the structure of the cornea, than a transverse section which is not radial.

2. The Second method of letting out pus from the anterior chamber which must be mentioned is by Saemisch's Section.

Here, the floor of the ulcer is divided through, the Graefe's Knife being entered in healthy tissue on one side & made to remerge in healthy tissue on the opposite side of the ulcer. As much pus as possible is then evacuated, & the wound reopened daily to let out any accumulation which may have taken place, until the ulcer begins to heal.

This operation is frequently done & often gives good results, but has the disadvantages, that it delays the healing of the ulcer ^{when} ~~the~~ ^{we} reopen the wound in the cornea, & that it is often difficult to evacuate the pus, especially when the ulcer is in the upper part of the cornea.

3. A third method of letting out the pus is by a horizontal incision across

the lowest part of the cornea - opposite the collection of pus behind it.

If the pus is thick it does not escape well, so a probe has afterwards to be passed at intervals to help its escape by keeping the opening patent. (The incision is made with an iridectomy ^(Keratome) knife). Prolapse of the Iris is apt to take place, & is the great disadvantage of this operation.

Looking at these three operations for opening the anterior chamber to let out hyphosion, I am convinced of the great advantages of the vertical radial incision, by which these cases have been treated, when necessary.

It may be supposed that the scar left after it will interfere with vision, but it never does so; since the incision is not prolonged beyond the edge of the Iris, & the linear opacity left after it is scarcely visible.

If after the pus has been evacuated by this incision, the case goes wrong & panophthalmitis results - it is due to the continued spreading of the ulcer & not because the anterior chamber requires to be reopened, & this has never been done in any of these cases.

The foregoing notes briefly state the method of treatment which has

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been employed in the sloughing ulcers of the cornea which I have collected; & considering that many of the cases were far advanced before they were seen, the results seem satisfactory. - In many of them where the ulcer is extensive we cannot expect the patient to get much vision, & must be satisfied if we can save the eye from total destruction.

So many other methods of treatment are recommended, that I cannot go over them all, but one or two may be mentioned.

Eserine lately has been much used by Soule & is said to have a direct effect on sloughing ulcers - being used by them in cases which before were always treated by Atropine, but since Iritis is a frequent complication in these cases, it seems to me advisable to keep the pupil dilated. - Eserine seems to be of special value in the marginal ulcers which are so frequently seen in unhealthy children.

The so called antiseptic treatment has been said to be alone sufficient to arrest the sloughing process. - Holtz, for instance, treats his cases by simply bathing the eye with a solution of Perchloride of Mercury.
(1-5000)

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Every hour, for the first twenty-four hours after the case comes under treatment, & says, that by that time, a marked improvement is noticed in the condition of the ulcer.

The frequency of the applications is then lessened, but continued at intervals until the ulcer is healed - By this means, Holby says, the germs are effectually destroyed & no other treatment is required.

Iodoform is often used in an ointment - 1 part with 9 parts of Vaseline - W. Berry of Edinburgh recommends it, after scraping & cauterising the ulcer with nitrate of silver.

Valude recommends a line of treatment which does not seem to have been much tried. He cleanses the eye first with an antiseptic lotion, & then applies a pad of Salol gauze, which is bandaged on & left undisturbed for three or four days.

By that time, he says, that sloughing ulcers have begun to look more healthy, & heal up rapidly when this treatment is continued - One special advantage claimed for this, is that the subsequent corneal opacity is very slight.

This certainly seems rather a peculiar line of treatment, & is obviously unsuited for cases with chronic conjunctivitis or dacryocystitis -

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II Later treatment - This means the treatment of the corneal opacity resulting from the ulcer, & the means adopted for improving the vision of the patient. The interference with vision caused by a corneal opacity, will vary in amount, according to its situation, density & extent.

The treatment adopted has been, first to try & help the clearing of the opacity by some mild local stimulant, which by slightly increasing the blood supply to the part, will help the tissue change. The

Engl. Hydrag. oz. flav. is used three daily, & the lid rubbed over the eyeball for a few minutes after each application, but there is great difficulty in getting patients to persevere with this treatment, when they find how slow is the improvement of vision.

The corneal opacity clears much more in children than in adults.

Other applications, as drops of solution of Pot. Iodide, or calomel dusted on the cornea, do not seem to be as good as yellow ointment.

In what cases & when is it advisable to try and improve vision by making an artificial pupil?

The situation & density of the opacity must guide us in giving an opinion as to whether an artificial pupil will improve vision.

If almost the whole cornea is opaque, & vision does not amount to more than shadows, it is useless to interfere; but if, on the other hand, the patient can count fingers, & there is a clear portion of the cornea at its inner or lower part, we would expect some improvement in vision, & would therefore operate.

Where a nebula is present, which although extensive is only slightly opaque, it is not advisable to make an artificial pupil; as some rays of light can still pass through the nebula, by making a larger pupil, we would probably cause more confusion of vision than before.

These are merely a few examples of types of cases met with, but such a variety of cases is seen that each must be treated on its own merits; no hard & fast rules can be laid down.

As to the time when we should operate - So long as improvement of vision is going on & the leucoma clearing it is better to wait, as the situation in which the iridectomy should be done will vary according to the extent of the opacity ultimately; so that often as long as six months or more should be allowed to elapse before we interfere.

Each case must be carefully examined, & the transparency & curvature of the cornea noted,

So that we may form an opinion, as to where an iridectomy will give the greatest improvement of vision.

It is a good plan to take the patient's vision before, & again after the pupil has been widely dilated; as if we find it is not improved in the latter case, we cannot expect much improvement after a small iridectomy.

Having the pupil dilated before we decide this, also helps us in that one finds that a nebula is seen much better against the black of the pupil after it is dilated, & the cornea often looks quite clear before this is done.

The iridectomy must be done where the lensoma interferes least with vision, but if possible, it should be below the level of the centre of the cornea.

The condition of lens, vitreous humor & retina should be investigated as far as possible, before we decide to interfere.

The best situation for iridectomy is downwards & inwards, or inwards, or downwards, & we cannot expect any marked improvement in vision, if it is done in the upper part of the Iris. The reason for the above situations being best, is because most objects seen by a person are viewed forwards & downwards, the line of vision being through the lower part of the cornea; so that after the

Strabismus, the eye is less removed from its natural axis, & squinting is less common, than when vision is acquired in any other direction.

It is doubtful whether an eye fixes eccentrically, while the other eye (healthy, one) is in action; but of course the better the vision obtained, the less chance is there of Squint.

When Strabismus is performed in a downward & inward direction, both eyes are operated upon, the axes of vision are nearly parallel.

Some authors assert, that when the vision in the healthy eye is good, it is better not to make an artificial pupil in the damaged one, because the pupils will not correspond, & probably confusion of sight, double vision, or Squint will result; but this is not always so.

It is important that the Coloboma made should be narrow, if a very small pupil is desired, the inner pupillary part of the Iris only removed, the outer ciliary part being left. If a large artificial pupil is made, the strong light dazzles, & vision instead of being improved is made worse.

When however the leucoma is extensive, & only a small clear space is left between its margin & the margin of the cornea, a piece of the whole breadth of the Iris must be removed, as if the outer ciliary part



was kept, it would prevent the entrance of rays of light through the very limited clear portion of the cornea.

For the Iridectomy, the incision should be made at the corneoscleral junction & not in the cornea; as, if it is made in the latter, the opacity resulting may obscure vision, as also may the slight haziness which sometimes spreads from it.

So far, we have been considering the cases in which it is advisable to perform an Iridectomy with the object of improving the patient's vision; but it is also often advisable to do this in cases of leucoma adherens, with another object in view.

In such cases, the eye often remains irritable due to the continual dragging on the Iris which takes place, with the object of relieving this, we should either divide the Synechia; or, if this cannot well be done, perform an Iridectomy. After doing so, the irritability of the eye gradually settles down, & this adds greatly to the safety of the eye & comfort of the patient; so that even if no improvement of vision can be expected, we should, in these irritable eyes, have recourse to one of these operations.

Before giving a tabulated list of the cases treated by the methods I have described, it may be well to state briefly the number of cases treated by each different method, & to state what results were obtained.

Of the 41 cases of sloughing ulcer of the cornea, 6 were in a hopeless condition when seen; & of the remaining 35 cases, 16 were treated by Atropine & Quinine drops alone; in addition to the drops, 6 had cautery, 3 were incised, & 10 were both cauterised & incised. Antiseptic lotion locally, & Quinine internally in all cases.

Of the 35 cases, 21 recovered with useful vision, in 9 the ultimate vision could not be ascertained, but in these, judging from the condition of the eye when last seen, the patient in all probability got useful vision. In 5 cases the vision amounted only to perception of light; but in no case was there total destruction of the eye, except the eyes which were in quite a hopeless condition when first seen.

Iridectomy was performed in 10 of the cases, in 3 of these to relieve the irritability of the eye in cases of leucoma adhaerens; & in the remaining 7, there was improvement of vision, where the Iridectomy was done with that object.

Tabulated list of Cases of Sloughing ulcer of the Cornea

No.	Sex & age	Cause	Condition when first seen	Time elapsed since accident	Time operative treatment	Operative treatment	Remarks & result
1	Male 3	chip of stone	Sloughing ulcer Small hypopyon	3 days	Sut. atrop & quinine Lotis Ocul. Forvie. Twist. Quinine (gr II) 10 days.	nil	ulcer central - Result - good. Small rebsula for which yellow oxide of mercury ointment used. V seems fair - but too young to test.
2	Male 63	piece of timber	" "	9 -	do.	Incision Cautey - 7 days later - repeat once	V now = fingers - Leuconema clearing.
3	Male 24	piece of coal	Sloughing ulcer	7 -	Sut. atrop & quinine Lotis Hydrag. Fuchlor Twist. Quinine (gr II) 10 days	nil	Large central ulcer when first seen. Two months after V = $\frac{6}{24}$
4	Male 57	piece of stone	Sloughed Cornea Hypopyon	14 -	do.	Incision. Cautey.	whole of Cornea sloughed - no hope and vision. Four months later, large Leuconema adherent. V = perception of light. Iridectomy & flattening advised.
5	Male 31	chip of coal	Sloughing ulcer Hypopyon.	5 -	do.	Incision Cautey, not bag - Iridectomy 6 months later	Six months after V = fingers at two feet. V is iris only, brown & in - after which V = fingers 3 feet.
6	Male 41	"	Large Sloughing ulcer, going on to Panophthalmitis	5 weeks	do	Cautey. Iridectomy of shrunken globe 2 months later.	ulcer had perforated when first seen - Iris raised up in the slough - Panophthalmitis.

No	Sex & age	Cause	Condition when seen	Time elapsed since injury	Non operative treatment	Operative treatment	Result - remarks.
7	Male 22	chip of coal	Swelling Ulnar - Paraphthalanitis.	6 days	Poultice after incision	Incision through globe. Stump amputated 2 months later.	Although only 6 days dead depressed since injury - eye was in state of Paraphthalanitis when first seen.
8	Male 50	do	Large Swelling Ulnar. Hypopycne.	8 -	cut. atrop. & Quinine. Ext. Hyg. Foulbor. & inst. Quinine. Yellow ointment later	Incision. Cautery 4 days later. Iridectomy - later. Cornea lacerated.	V = perception of light - slightly improved after Iridectomy - Cataract noticed after starting - probably cornea anteriorly, perforated by the needle - extrusion of lens later.
9	Male 37	"	Swelling Ulnar. Hypopycne - Corneal Paraphthalanitis	5 -	"	Incision Cautery	Too far advanced when first seen - Stump to be amputated.
10	Male 60	"	Large Swelling Ulnar	3 weeks	"	Iridectomy - 6 months later	Nearly whole cornea ulcerated. Six months later V = fingers at two feet. Iridectomy (in + up) - after which V = fingers at 8 feet.
11	Male 23	"	Swelling Ulnar.	3 days	"	nil	Large translucent nebula left - which V = $\frac{2}{60}$ is clearing
12	Male 45	"	do	7 -	"	nil	Four months later V = $\frac{6}{36}$ Small nebula - not dense.
13	Male 20	chip of stone	do	10 -	"	nil	Six months later V = fingers at 8 feet.

No	Age Sex	Cause	Condition when seen	Time since accident	Non-operative treatment	Surgical Treatment	Result & remarks
14	male 57	chip of cornea	Sloughing ulcer Hypopyon	7 days	Eut. Atrop. i quini. Ext. Hyg. Freckles. Unist. Quinidine	Incision Iridectomy & Iatromy later.	Two months after accident - there was large leucoma adhaerens below - T = fingers at 2 feet. After Iridectomy inwards T = fingers at 5 feet.
15	male 60	chip of ~~cornea~~ cornea	Large sloughing ulcer Slight Staphylococcus. later.	3 -	"	Enucleative later	Refused treatment at first - Staphylococcus of cornea followed & no vision.
16	male 20	chip of stone	Sloughing ulcer	4 -	"	Cautery twice	Ultimate T could not be found out -
17	male 60	chip of cornea	Sloughing ulcer. Hypopyon.	6 -	"	Cautery. Incision. Iridectomy later	Leucoma left over lower inner part of cornea & T = fingers at 2 feet - Iridectomy (in up) 9 months later - after which T = fingers at 5 feet & $\frac{3}{60}$.
18	male 40	"	Sloughed Cornea. Hypopyon.	6 -	"	Cautery Incision. Double Iridectomy Enucleation.	Uter perforated & leucoma adhaerens resulted. Double Iridectomy done three months later. but no vision & eye remained irritable. So enucleated.
19	male 42	"	Sloughing ulcer Hypopyon	7 -	"	Incision Cautery	Leucoma small - but ultimate T not obtained.
20	male 46	"	"	14 -	"	Incision Cautery Iridectomy later	Three months after accident there was complete anterior Synechia & leucoma up + 1. Double Iridectomy inwards & tissue became normal - ultimate vision doubtful.
21	male 45	"	"	3 -	"	Incision	Ultimate vision fair - ~~anatomy~~ not ascertained.

No.	Age & Sex	Cause	Condition when Seen	Time Elicited since accident	Pre-operative Treatment	Operative Treatment	Result & Remarks.
22	Male 50	chip of cor	Sloughing ulcer. Hypopion.	14 days	Euth. Drops & Prime. Sol. Hyg. Perchlor. Wash: Quinine.	nil	V ultimately = fingers at 4 feet =
23	Male 49	"	Sloughing ulcer.	5 -	"	"	V not ascertained. but small nebula only, when last seen -
24	Male 50	"	Sloughing ulcer	12 -	"	Cautery	Small central leucoma left, & V = $\frac{3}{60}$ fingers at 4 feet =
25	Male 35	"	Sloughing ulcer. Hypopion.	3 -	"	nil	Hypopion soon disappeared, & V when last seen = $\frac{6}{60}$
26	Female 39	"	Two small sloughing ulcers	4 -	"	nil	Ultimate vision about $\frac{6}{36}$
27	Male 50	"	Sloughed Cornea Hypopion.	7 -	"	Incision Cautery & bandage later	Cornea had sloughed when first seen - V = perception of light.
28	Male 48	chip of stone	Sloughing ulcer	7 -	"	nil	Slight vision - exact amount could not be ascertained.
29	Male 40	chip of cor	Sloughed Cornea Hypopion	5 -	"	Incision	Cornea sloughed when seen - V = perception of light.
30	Male 36	"	Sloughing ulcer Hypopion	7 -	"	Cautery. Strabismus later.	Central leucoma. Strabismus, inward 3 months later. & V improved slightly to fingers at 3 feet =

No.	age & sex	cause	condition when seen	Time elapsed since accident	nonoperative treatment	operative treatment	Result & remarks
31	male 53	chip of coal	two small sloughing ulcers	4 days	Euth. Atrop. & Quinine. Ext. Carb. Boracic Tinct. Quinine	nil	eye vib well - but ultimate vision not ascertained.
32	male 16	gunpowder explosion	sloughing ulcer	1 -	"	Canterbury Iridectomy later	abrasion of cornea & numerous foreign bodies embedded in it. as many as possible removed. $V = \frac{6}{60}$. Iridectomy inward 4 months later, but no marked improvement on account of numerous small opacities.
33	male 49	chip of coal	"	4 -	"	nil	Seven months later $V = \frac{6}{60}$. No Iridectomy advisable, as not improved when under atropine.
34	female 65	spark from file	sloughing ulcer. Hypopyon.	14 -	"	Canterbury Iridectomy later	Large leucoma adherens resulted. $V =$ only perception of light. But as eye very irritable. Iridectomy was done to relieve this.
35	male 30	chip of coal	"	5 -	"	nil	$V = \frac{6}{60}$ when last seen.
36	male 25	chip of iron	sloughing ulcer	6 -	"	nil	Small central leucoma - clearing - V now $= \frac{6}{36}$ - improving.
37	female 42	piece of cement	sloughing ulcer Panophthalmitis	14 -	Purities after incision.	Globe incised Emulsification later	Too far advanced when seen -

Age & Sex	Cause	Condition when Seen	Time elapsed since accident	How operative treatment	operative treatment	Result - Remarks.
38 male 5	slip of stone	Strangling Ureter	3 days	Ext. Abdominal Lit: Ant Boreine Quint: Quinoid.	nil	Small ureter left. Tummy pain - exact amount doubtful - as too young to test accurately.
39 male 40	piece of wood	Strangling Ureter. Hypertrophie.	7 -	"	Incision. Cantury tube.	Ureter perforated soon after operation - was first seen - Lanceoma adherens. T = fingers at one foot.
40 male 24	slip of coal	Strangling Ureter	4 -	"	nil	Small ureter remains - T = $\frac{5}{36}$ improving.
41 male 13	piece of lime	Strangling Ureter	7 -	"	Cantury	Exact amount of vision could not be ascertained. Small Lanceoma when last seen -

B. Next we come to injuries to the cornea
which have not resulted in sloughing ulcers.

I do not intend to give a detailed list of the cases in which a foreign body has lodged in the cornea & been removed from it; & where the case has progressed favourably without any complication. - About 25 such cases have been seen, during the time the other cases have been collected.

The treatment adopted has been, After removing the foreign body, the eye is bathed with warm Boracic Acid lotion every three or four hours, or if there is much pain & irritation, poppy head fomentations are ordered. - Under one of these, the irritation as a rule soon subsides.

If however, the foreign body has destroyed much of the corneal tissue, or been of septic material, we may get complications resulting, as ulcers, iritis &c. which must be treated according to the condition present.

As to other wounds of the cornea not
resulting in sloughing ulcers, such as abrasions, or small incised wounds, some simple treatment is usually sufficient; but we must watch carefully for unfavourable symptoms. - Treat them if they arise.

For abrasions, a few drops of Castor oil

often relieve the irritation, or if the eye is very painful, fomentations of poppy heads or Belladonna should be tried. Atropine should usually be used, on account of the tendency to Ditis.

Such a variety of cases are met with, that one cannot enter fully into all the different lines of treatment which may be required -

I may state here that Perchloride of Mercury lotion has been used in some of the cases in this class, & in many of the sloughing ulcers, & as some surgeons have stated that it causes the cornea to become opaque at times, it is well to mention, that this has not been noticed in any of these cases -

Injuries to Cornea not resulting in Sloughing ulcers - tabulated list.

No.	Sex & Age	Cause	Condition when first seen.	Time elapsed since injury	Time-operative treatment	Operative treatment	Remarks
1	male 19	splitter of wood	wound of cornea the pupillary slight iritis. 	4 days	Ext. Atropine gr. 1/100 Sol. Hyal. Ferriol. Unit. Quinae	Nil	Horizontal wound of cornea - no ulceration - slight iritis. Pupil acts. False membrane in pupil. Ophthalmoscope = fundus reflex - but no details. $V = \frac{6}{9}$ fingers at 3 feet. By end of a week - the false membrane & hypopyon were gone. One month later nothing abnormal seen with ophthalmoscope. Seen at end of one year & $V = \frac{6}{6}$ - cornea hardly visible.
2	male 25	piece of iron	Vertical wound of cornea	14 -	Ext. Atropine gr. 1/100 Sol. Quin. Boric.	Nil	Wound extending from upper margin to centre of cornea. Pupil slightly dilated. Wound unhealthy & upl irritable at first, but this subsided wound healed up well. Small scar left. Vision very good. Exact amount not ascertained.
3	male 44	piece of steel	Abrasion of Cornea.	2 -	" yellow ointment 3x4	Nil	Superficial abrasion in centre of cornea. ultimate $V = \frac{6}{9}$.

No. of Hen	Cause	Condition when Seen	Time Elicited since injury	Non-operative Treatment	Operative Treatment	Remarks & result-
4 " "	shot from a gun	Bruise Cornea Hyplaema.	2 days	inst. Atropin to eye.	nil	Cornea largely in center - no breach of surface seen. Anterior chamber half filled with blood. T: fingers Blood absorbed by end of four days. & That end of fortnight = $\frac{6}{6}$.
5 " "	gunpowder explosion	Burnt and abraded Cornea	6 hours	inst. Atropin to eye. Irrigated with lots of Hyd. Perchlor. wash & lowered fast. Wash. Subconjunctival one week later	Numerous foreign bodies removed from the cornea.	Many particles of powder embedded in the cornea. - Hyplaema.  Eye improved rapidly. Tubercles cleared slowly, & at end of one year T = $\frac{6}{6}$. Some specks still remain, chiefly round the margin of the cornea.

Injuries to Cornea and Lens.

Injuries to the Cornea & Lens, with the resulting traumatic Cataract, may be caused by a great variety of objects, as is seen by looking at the few cases here collected.

Of these, 2 were injured by a thorn, 2 by piece of coal, & one each by a piece of steel, piece of glass, fork, stone & roberite cap -

Of these nine cases, 6 recovered with useful vision, one did not improve as regards vision on account of leaving a detached retina, & the other two are still under treatment.

Injuries to the Cornea & Lens alone, are not so frequent as one might expect, owing to the liability of the adjacent parts to be implicated, but if alone injured, a very fair ultimate result may be expected.

The progress of each case depends to a great extent on the amount of damage done to the lens capsule -

If considerable laceration of the capsule has taken place, there is rapid swelling of the lens, & the formation of a Cataract when the aqueous humour comes in contact with the lens fibres, followed by absorption of the soft matter.

If, on the other hand, the aqueous humour cannot gain free access to the lens fibres, the opacity takes place less rapidly, &

*the swelling of the lens is much less.

An example of this latter is seen sometimes after a blow on the eye, when the lens capsule is ruptured at the periphery, where the thicker anterior joins the thinner posterior capsule, or in the latter; for in neither of these cases can the aqueous humour gain access to the lens fibres, as it can when the anterior capsule is wounded.

The absorption of the lens goes on very slowly in such cases, so that it is evident, that the progress of a case depends greatly on the amount & situation of the injury to the lens capsule.

It is important to remember, that the pressure of a swollen lens causes more irritation in an adult than a child, & that the rapid swelling of the lens in an ^{child} ~~adult~~ is better borne, than a slower & more limited expansion in an adult, which latter may excite dangerous inflammation if it occurs in an old person.

The reason is expressed by Von Graefe when he says:—"On the one hand the lens is softer, & causes less mechanical irritation when the patient is young; for the other, the Iris becomes progressively more irritable as age advances".

The treatment which has been adopted in these cases may be conveniently divided into early, late.

1. Early treatment. - From the time when the case is first seen, Atropine drops are used to keep the pupil dilated. By doing this, we make room for the swelling lens, & prevent it encroaching on the iris, as the swelling, if rapid, is apt to cause Iritis, or Secondary Glaucoma by pushing the Iris forwards & blocking the angle of the anterior chamber.

If the soft matter of the lens is coming out of the capsule, it also irritates the iris, so we are apt to get adhesions formed, if these do take place it is better for them to be peripheral.

The frequency of the Atropine drops, is lessened from three to once daily, after the pupil is dilated & all irritation has subsided, & this is continued during the time that the lens substance is being absorbed.

When the irritation, caused by the soft lens matter in the anterior chamber, does not subside, it must be let out.

Panas of Paris^{says} that where we have much irritation we should first try cupping & cold locally, & does not operate unless distinct symptoms of glaucoma develop. Then he advises repeated puncture along with myotics, before leaving

recourse to Iridectomy with extraction of the lens.

De Wecker says, that no advantage can be gained from the use of Atropine, except where the Iris shows signs of irritation & synechiae have formed; but it seems to me advisable to use Atropine from the first, if only to lessen the tendency to iritis, & prevent the irritation & synechiae if possible.

If we have a case where the lens is opaque, but the lens matter is not being absorbed, we may hasten this by needling & later to a 'linear extraction'.

In some cases, as after a blow, where the lens capsule has been ruptured at the equator, or when a wound in the capsule has closed soon, little or no aqueous humour gets into the lens substance & no absorption goes on; but later, secondary changes may take place as in Senile cataract.

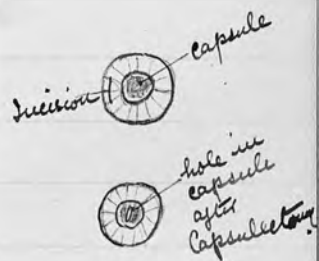
2/ Later treatment - If the case goes on favourably we find at the end of some months that the lens capsule alone remains, the time which the absorption of the soft-matter takes varying much in different cases.

The capsule left often causes impairment of vision, but nothing should be done to it until all irritation has subsided. Then, we must by some means either make a hole in the capsule or remove it.

For the first of these we usually have recourse to wedging, two needles being used, by them a small hole is made in the capsule which is all that is required. (cases 1 & 3).

Sometimes the capsule is so dense that this operation is of no avail, for the rent made in the capsule closes again - In such cases, the operation of Capsulectomy should be done. (case 6).

To do this, an incision is made with a keratome a little inside the margin of the cornea, a pair of Capsule or Iris forceps are introduced, & a piece of the capsule seized near its centre. This is drawn gently to the edge of the wound where a piece is cut off.



The remainder goes back with a hole in it, which if near the centre, makes a very good artificial pupil & considerably improves the patient's vision.

The great advantage of this operation is that it causes much less irritation than the removal of the entire capsule; & so far as I am aware does not seem to be well known.

Mr. Lawson says that removal of the capsule entire is a very dangerous operation & not usually justifiable.

Adhesion of the capsule to the corneal wound may cause irritation & even glaucoma in rare cases. When such exists it must be divided, after which, an eye which has remained irritable for a long time usually settles down completely. - (as seen in Case 1).

Tabulated list of cases of injury to cornea & lens.

No. of Case	Cause	Condition when seen	Time elapsed since accident	Preoperative treatment	Operative treatment	Result & remarks
1	Explosion of white cap	Wound of cornea & lens. Traumatic Cataract.	14 days	Ext. Atrop. gr. IV twice - quinine 10 gr. bid in 3 weeks - Ext. Atrop. gr. II once daily.	April 10. Adhesion of capsule to cornea divided - May 30. Capsule needed	Feb 10. When first seen eye inflamed - Substituted water drops March 14. Eye became very irritable - photophobia - Adhesion iris to capsule. Capsule to lens. Dislocated lens. Atrop. gr. IV 10 gr. bid - 4 punctations of Boric Acid 4 drops 4 times. Pupil dilated. Small superficial infiltrations of cornea. Feb 28. Irritation subsided. Infiltrations fewer - frequency of Atropine decreased - Adhesion divided & capsule needed later on. Finally, irritability settled down completely - V = fingers at 4 feet.
2	piece of coal	Vertical wound of cornea & lens. Traumatic Cataract.	6 weeks	Ext. Atrop. gr. IV bid.	nil	Dec 8. Vertical wound near outer margin of cornea. Lens opaque, part of it in anterior chamber. Jan 16. Little soft lens matter still remains. Iris adherent to capsule below. Feb 27. Capsule only left - Good opening in center of it & V = fingers at 6 feet (without a lens)
3	thorn	Vertical wound of cornea & lens. Traumatic Cataract.	4 days	Ext. Atrop. gr. IV to bed	Feb 13. Trephining capsule 	Nov 3. Part of lens in anterior chamber. Jan 16. Soft matter nearly all removed. Posterior capsule. Feb 27. Capsule only remains. after trephining, V = fingers at 6 feet (without a lens)
A	thorn	Wound cornea & lens. Traumatic Cataract.	1 week	"	nil	Part of lens in anterior chamber when first seen - Small amount near outer margin of cornea. Soft lens matter ~~remained~~ divided - V = fingers at 1 foot.
5	piece of stall	"	7 -	"	nil	Wound at lower edge of cornea - lens opaque - at end of 15 months when seen V = fingers at 1 foot. trephining advised.

No.	Sex & age	Cause	Condition when first seen.	Time elapsed since injury	non-operative treatment	operative treatment	Result & remarks.
6	Female 15.	point of fork	wound cornea & lens. Traumatic Cataract.	6 years.	Sust. Atrop. gr. II ter. bic. after operation.	Capsule removed	when first seen, capsule blocking up whole of pupil. Small tear near lower margin of cornea. After capsulotomy (done as described in notes) V = fingers at 3 feet (without a bag)
7	Male 23	piece of glass.	wound of Sclerotic. Traumatic Cataract.	five years.		Capsule removed inside - after incision at margin of cornea by keratome. Cosmetic operation (satisfied & it is satisfactory).	Scar at seat of old wound at lowest visible part of sclerotic (on looking up). Lens opaque & involved with the first seen - Colerous looking capsule left. with opthalmoscope - as fundus reflect. Projection not very good. (Patient anxious for operation - or it would not have been done) - told not to expect any improvement of vision. Detached retina seen as some as capsule removed. V = shadows.
8	Female 12.	Stone (on eyelid)	Traumatic Cataract.	one year	Sust. Atrop. gr. II bis die.	'Grasping'	(No wound of cornea here - but case put in this class for convenience.) Very small ruptured at margin of anterior capsule - no doubt due to blow of the stone, which struck the eyelid. Absorption of lens matter very slow. Quested to hasten this; lens matter to be let out a few weeks later.
9	Male 26	piece of coal	wound cornea & lens. Traumatic Cataract	9 days	Sust. Atrop. gr. II ter. bic.	nil	wound small. Lens opaque - part of it in anterior chamber. Small adherent of iris to the wound. Soft lens matter gradually getting absorbed. Still some left when last seen -

Injuries to Cornea, Iris & Lens.

In this class, I have not included those cases in which the ciliary region was involved, but shall speak of those separately.

Of the 9 cases here noted, 6 recovered with useful vision (cases 1, 2, 3, 5, 6, 8); of the other three, one went wrong because the patient refused treatment (9), in one a sloughing ulcer was present which went on to panophthalmitis (7), & in the remaining one, the eye was removed on account of symptoms of Sympathetic irritation in the opposite eye (4).

The nature & extent of injuries to these regions of the eye, varies much in different cases, & when a case is first seen, one must decide whether an attempt shall be made to save the eye or not. On the one hand, we wish to save an eye if there is a chance of useful vision in it; whilst on the other, we must carefully consider what risk the opposite eye is running, during the whole treatment of the case, where we have decided to try & save the injured eye.

As Mr. Nettleship says - 'Judge each case from two points of view, the damage to the injured eye, & the risk to the sound one; & the question, whether to sacrifice or to attempt to save the former, is often very difficult to decide'.

Walton in his book on the eye says - 'No extent of injury short of actual collapse should destroy our hope of being able to restore an eye to some degree of usefulness'; so that, we should never condemn an eye if there is a possible chance of it being of use to the patient.

Having decided to attempt to save the eye, the following are the lines of treatment which have been adopted in the cases here; varying of course, according to the time which has elapsed between the injury & when the patient is first seen by the Surgeon.

1. Early treatment - First, examine the eye to find whether the foreign body, which has caused the injury has lodged in the eye, & if not, proceed as follows. Atropine drops are used from the first, to keep the pupil as well dilated as possible, & the eye bathed with a solution of Boracic Acid or Perchloride of Mercury.

Prolapse of the Iris often occurs (as in cases 2, 3, 4 & 7). If seen within an hour or so of the injury, some have tried to return the prolapsed part, either by manipulation or by the help of Atropine or Esarine drops, but this was not possible in any of these cases.

If seen within the first two days or so (cases 2 & 3) the prolapsed Iris having been drawn further out of the wound with a pair of vis forceps,

a large piece of it is cut off with scissors, & the cut ends replaced by a curette, to prevent them from becoming entangled in the wound during the healing process -

The object of doing this, is to prevent the subsequent dragging on the Iris which takes place when it gets incarcerated in the wound, which keeps up irritation & increases the danger of sympathetic inflammation - This is so, whether the germ theory of Sympathetic disease is true or not -



Some authorities object to cutting off the prolapsed part of the Iris, as for instance, Mr. Lawson who says that there is a danger in doing so, because the wound in the cornea not being clean cut, does not heal up well, & there is apt to be additional protrusion of the iris & more displacement of the pupil -

This however has not occurred in any of the cases where the operation has been done here, neither in this class of cases, nor in those where the wound involved the Ciliary region -

After this has been done, the Atropine drops are continued, the frequency with which they are used being lessened as the irritation subsides -

2. Later treatment - If we consider a case which is not seen by the Surgeon for days

or weeks after the Iris has become prolapsed, (case), or in which the Iris without being prolapsed gets drawn into the wound during the healing process (cases 598), we find, that as it gets mixed up with the cicatrix there is a continual drag on it, & some means must be adopted to relieve this -

This may be done by various operations -

- a) By doing an Iridectomy opposite the original wound - as done in cases 145. The objection to this is that it does not completely relieve the dragging on the Iris.
- b) Remove a piece of Iris at the seat of the original wound, which is the favourite operation with many authorities.
- c) The operation, which I wish to speak highly of, is that of double Iridectomy - in which an iridectomy is performed on each side of the place where the Iris is adherent to the Scar. A Graefe's Cataract Knife is introduced near the margin of the cornea on one side of the wound, passed behind it, brought out at a corresponding point on its opposite side. Now cut outwards for a short distance, as in doing Sclerotomy, stopping short of the Scar to which the Iris is adherent. After withdrawing the Knife two openings are left, through which a piece of Iris is excised on each side,



& the operation completed as for an ordinary
Iridectomy.

This operation was done in Case 6, & as will
be seen further on, in several cases of wounds
involving the ciliary region. Although
not generally well known or employed, it
seems to me preferable to either of the two
former operations, as it has the advantages,
that it effectually relieves the dragging on
the Iris, & that the original wound is not
interfered with. The result is

practically the same as when in a case
which is seen early, the prolapsed Iris is
drawn out & cut off, although, after the double
Iridectomy, there is a small portion of Iris
left adherent to the Scar.

After absorption of the soft lens matter, the
capsule will be left, & may either be left
alone, or treated by needling, or capsulectomy,
according to what has been said when speaking
of this before.

Adhesions of the capsule to the Iris or
Scar may require treatment.

Briefly stated - of the 6 cases where the eye was saved,
in two the prolapsed Iris was excised (2, 3), & in three cases
subsequent Iridectomy done (4, 5, 6). In two, adhesions of the
capsule to Scar were divided (3 & 6), & in one capsulectomy ^{done} (1)
& in one partial extraction of the lens when the tension
of eye went up (5).

Tabulated list of Cases of injury to Cornea, Iris, & Lens.

No.	Age & Sex	Cause	Condition when first seen	Time elapsed since accident	Non-operative treatment	Operative treatment	Result - & remarks -
1	Male 15	point of nail.	wound near lower margin of Cornea - involving lens & Iris also. 	6 weeks	Ext. Atrop. gr. IV to eye.	Iridectomy (opposite original wound) Capsulectomy (6 months later)	When seen 6 weeks after accident the Iris was raised up in the tear. Iridectomy done opposite this to relieve dragging on the Iris (one month later). After this, Atropine drops once daily for 4 months. After Capsulectomy, $V = \frac{3}{60}$, fingers at 4 feet - (without lens) 
2	Male 25	piece of iron	wound of Cornea Iris & lens. Protrusion of Iris.	24 hours.	Lot's Hyf. Perchlor. Surg. Iridectomy & Atropine - dis. sol.	Excision of prolapsed Iris.	wound extended from margin to centre of Cornea.  after vision of pupil Iridectomy Iridectomy was applied in the Iridectomy Iridectomy - protrusion of lens Four months later $V = \frac{3}{60}$. Capsule of lens remains - adhesion of Iris to capsule, capsule to tear. - may be needed.
3	Male 18	scale of iron	wound of Cornea Iris & lens. Protrusion of Iris. 	2 days	do. after one week, Ext. Atrop. gr. II to eye.	Excision of the prolapsed Iris. Three months later, breaking down anterior synechia.	wound extended from margin of Cornea, inwards & downwards to beyond its centre - no iridectomy of eye after anterior synechia was divided. One year after - $V =$ fingers at 3 feet - (without lens) Some capsule still left, small anterior synechia - no iridectomy - quite comfortable.

No	Age Sex	Cause	Condition when seen	Time elapsed since injury	non-operative treatment	operative treatment	Result & remarks
4	male 13	point of a nail.	Large wound of Cornea, Iris & lens. Iris mixed up in the wound.	8 days	Eut. Atrop. griv 1st bil. Eut. Iodoform Sotio Hydrat. Fuchsiol.	Emulsification (3 weeks after injury).	at first very beautiful if eye could be saved. Remained in much the same condition for a fortnight, when signs of early suppurative inflammation were found in opposite eye (R). Pupil sluggish, eye red & watery. Injured eye now quite soft. So was emulsified - after which irritation in other eye soon subsided - no recovery.
5	male 18	gunpowder explosion	wound of Cornea, Iris & lens. Iris entangled in the wound.	24 hours	Aug 13. Eut. Atrop. E. p. p. Sotio Acid. Bone. 4th hour. Sept 20. Eut. Atrop griv 4th hour.	Sept 16. Partial extraction of lens. - 13 when Contrahed. Oct 31. Irregularity (inward & outward) Dec 20 Irregularity (in & down).	Sloughing ulcer of Cornea resulted, so pain was added to the atropine drops. Tension of eye went up - so partial extraction of lens was done - considerable dragging on Iris from being adherent to the wound - so did iridectomy opposite (in trap) Central Scurria resulting from ulcer - so to improve vision did iridectomy, inward & downward. V = fingers at 4 feet.
6	male 30	rust head.	wound from nail to centre of Cornea, injuring Iris & lens. No anterior chamber.	24 hours	Eut. Atrop griv 4th hour. " 1st bil (later).	Jan 16. Irregularity April 14. Healing & breaking down adhesions.	Done on Dec 13. Jan 30. Scurria adherent - considerable pain & irritation from dragging on the Iris - which was relieved by double iridectomy - Atropine still continued. Feb 14. Capsule adherent to lens - separated. V. afterwards = $\frac{6}{60} C + 11 D$. 

No. Age & Sex	Cause	Condition when seen	Time elapsed since accident	Non-operative treatment	Operative treatment	Result & remarks
7 male 30	piece of coal	wound of Cornea, Iris & lens. Protrusion of Iris. Sloughing ulcer of Cornea going on to Panophthalmitis.	3 days	Eust. Atrop. gr. 1/4 twice. Solis Hyf. Paral. loc.	Incision through the globe. Amputation of stump - 6 months later.	when first seen pupil was occluded with lymph, which also fills the wound. Sloughing ulcer went on to Panophthalmitis, & globe incised.
8 male 25	piece of steel	wound of Cornea, Iris, & lens.	4 days	"	- nil	when last seen, the Iris was adherent to the Scar. Eye been very irritable, but then was subsiding. Ultimate result - could not be found - but eye was saved.
9 male 4	gun cap explosion	wound of Cornea, Iris & lens. Sloughing ulcer of Cornea & Suppuration.	7 days.	Eust. Atrop. - 2 grains Solis Hyf. Paral. loc. 4 - times.		After first three days, parents refused to allow child to be treated. So eye went to the bad. When seen one year after - there was no vision or fundus reflex. Pupil adherent to old Scar. Eye shrunken - but not softening. No irritation of opposite eye -  all - found

Wounds of Eye involving the Ciliary Region.

In speaking of injuries involving this region, we are especially brought face to face with the important subjects of Sympathetic irritation & inflammation; but it is impossible for me here to attempt to discuss so large a subject, about which so much has been written, & so many different views expressed.

Here, I shall only refer to it in passing, & as I have only one case of Sympathetic irritation on my list, perhaps that is all that is necessary.

As in the last class of cases, so here, we may have difficulty in deciding whether it is advisable to attempt to save the eye or not, & must keep before us the fact, that injuries to this region are especially liable to cause Sympathetic inflammation.

By some it is believed, that this is more likely to result in children than in adults, but observations made by Mr. Marcus Gunn some years ago, convinced him that the tendency to sympathetic inflammation is greater in aged people, however there still seems to be considerable difference of opinion on this point.

Spalding in Boston Journal (1892) says. "In the eye of a child under ten, with perforating injury of any sort, in any region of

the eye, we should enucleate at once, on account of the greater tendency to sympathetic inflammation in a child. This

seems rather a sweeping statement, although, probably a perforating injury of the eye is the most dangerous kind.

As regards age, looking at the 6 cases I have here, I find that four of them were under ten years of age (Nos. 2, 3, 4, ~~5~~⁶). No. 4 was hopeless from the first, & in No. 5 there was much vitreous lost & there was little hope of saving the eye; but in each of the other two cases, (Nos. 2 & 3), the patient recovered with useful vision. & one would not think of sacrificing such eyes as either of these, without giving them a trial first.

Of the whole six cases, I may say that two were hopeless from the first, & were enucleated (4 & 5); & of the remaining four cases, in three useful vision was got (1, 2 & 3), but in the other there was no vision, the eye softened & was enucleated (6).

In cases 1, 2 & 3 there was prolapse of the iris, & in cases 1, 2, 3, & 6 there was no injury to the lens.

As the injuries involving the ciliary region are often similar to injuries where the cornea, iris & lens are alone affected, the treatment is on much the same lines.

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1 Early treatment. Atropine drops are used from the first. The Iris when prolapsed, & seen within the first few days after the accident, was snipped off (243). - When there was no chance of saving a useful eye, enucleation was done -

2 Later treatment. When the Iris is mixed up in the tear in the cornea, the dragging on it must be relieved by one of the methods before described. In Case 1 a single iridectomy was done, & in cases 2, 3 & 6 ~~a~~ double iridectomy. The latter operation, here also, seems to me much the most preferable -

Tabulated list of Cases of Wounds of the Eye involving the Ciliary Region.

No	Age & Sex	Cause	Condition when first seen	Time elapsed since injury	Non-operative Treatment	Operative Treatment	Result - Remarks
1	Female 16	Shuttle (weaving machine)	wound of Cornea, extending through ciliary region. Protrusion of Iris. Lens not injured.	7 days	Extr. Atrop. gr. 17 Tid. 2x. - bis die (3 weeks later)	Iridectomy (inwards & upwards)	March 7th Head of Vitreous lens was prolapsed - Iris. Patient refused to allow prolapsed part of Iris to be removed. Eye carefully watched for unfavorable symptoms. May 2nd. Head of Vitreous quite disappeared. Eye looks fairly well. $V = \frac{6}{8}$. June 2nd. Wound slightly epithelialized. Iris on inner side adherent to wound - pinned up with it. Below the outer side is free. with ophthalmoscope - nothing abnormal seen. Can move easily. Still time on watch - July 10th. Iris free on wound - outside. Aug 10th. Accident - on Feb. 7th when seen on 10th there was head of lymphoma round prolapsed Iris - after double iridectomy - close to original wound. eye settled down. This very well. July 14th. $V =$ fingers at 8 feet - Vision normal. Drops now once daily. Protrusion of Iris wound After part of prolapsed Iris cut off. after double iridectomy.
2	Male 5	Sharp stone	wound involving ciliary region & extending to the centre of cornea. Iris prolapsed. No injury to lens.	3 days	Extr. Atrop. gr. 17 Tid. 2x. Extr. Iodoformic bis die.	Feb 10. Part of prolapsed Iris cut off. - 27 Double iridectomy.	

No	Sex & age	Cause	Condition when seen.	Time elapsed since injury	non-operative treatment	operative treatment	Result & remarks.
3	Female 3	Sharp end of a stick.	wounding of ciliary region. Iris prolapsed. Lens not injured.	24 hours	Eust. Atrop. gr. IV twice. one week later. Eup. Atrop. Antagonist over daily	Double iridectomy	Prolapsed Iris was not cut off. Double iridectomy one week after accident. Eye settled down. No bad symptoms. Five months later. V: fingers. (Best amount could not be ascertained, as child is too young). Iris adherent to lower half of lens in cornea - incision removed.
4	Male. Quarter.	Point of scissors.	wound involving ciliary region. Welling half inch into sclerotic. Iris prolapsed. Considerable vitreous lost.	4 hours	Eust. Atrop. gr. IV 4 to 6 hours. Eup. Ant. Borneo	Emulsification (10 days after)	Under attempt to save eye. As parents would not consent to emulsification at first, attempt emulsion of eye was dropped. Eye going worse. So emulsified 10 days after.
5	Male 15	blow with stone	Rupture of globe through ciliary region. Vitreous lost.	6 hours	nil	Emulsification.	Eye quite collapsed. - Emulsified at once -
6	Female 6	piece of broken aug.	wound of cornea extending through ciliary region half inch into sclerotic. No injury to lens.	3 hours	Eust. Atrop. gr. IV 4 to 6 hours.	Superficial suture when first seen. Double iridectomy (one month later) Emulsification (6 months later)	When first seen there was some Vitreous lost. Tension - . Advisable to attempt to save the eye. Impaired very markedly & Tension became normal - & remained so for 3 months. V: nil. with aphthidial ulcers - no further relief - & lens clear. Three months later - eye getting very soft - & no vision - Emulsification ~~at once~~ .

Injuries to the Eye without External Wound.

The cases seen which come under this heading have been those of Traumatic Iritis, Detached Retina, Haemorrhages into Vitreous Humour, ~~and~~ ~~Retina~~, Concussion of the Eyeball, & Suppurative Amblyopia.

So many lines of treatment have been tried in these different conditions, that I shall not attempt to discuss them all; but merely to mention what has been done in these cases.

My reason for recording them, is simply to complete the list of cases which have resulted from an injury.

As to the detached retina cases, there was no marked improvement in any of them. Puncture of the Sclerotic, behind the detachment, was tried twice - the patient being kept quiet in bed for three weeks after; but this did not appear to have any beneficial effect.

The more heroic methods of treatment, by injecting Iodine in front of the detached portion of the retina, or by continuous drainage by a gold thread, as recommended by De Wecker, or by drawing off the subretinal fluid with a trocar, were not tried.

Myopia was present in three out of the 4 cases - The treatment adopted is mentioned with the cases -

For the cases of Traumatic Iritis, the treatment

was much the same as for other forms of
Dritis. Atropine drops locally, with mercury
& Iodide of Potassium internally. When pain is
severe leeches or blister to the temple -

For other treatment see notes of cases.

Injuries to eyeball without external wound-

No	Age & Sex	Cause	Condition when seen.	Time elapsed since injury	Non operative treatment	Operative treatment	Result - Remarks
1	Male 42	Struck on eye by a cinder	traumatic lacer.	2 weeks	inst. atrop. gr IV bid. mercury iodide of Potassium internally - Euphrasium Symp (to temple)	nil	Jan 12 - Pain in eye severe when first seen. Pupil did not dilate well with atropine at first - Posterior Synechia above & below. Blood-clot on anterior capsule of lens. with ophthalmoscope, could not see any fundus details. - 19 - Amblyopia slightly improved. Blisters on temple as pain severe. - 30 - Still little blood on lens. many fine dots. $V = \frac{6}{18}$ c + 11500 = $\frac{6}{12}$ Feb 20 - Now no blood on lens capsule. Still few dots on lens in a ring where iris was adherent. $V = \frac{6}{6}$. Fundus can be clearly seen.
2	Male 35	Blow on eye	traumatic lacer.	4 weeks	inst. atrop. gr IV bid. mercury iodide of Potassium internally. Euphrasium Symp (to temple)	-	Pain severe for one week. False membrane in pupil - $V =$ fingers at 4 feet. Eye improving - still under treatment.

No	Age & Sex	Source	Condition when seen	Time elapsed since injury	Time operative treatment	Operative treatment	Result - Remarks
3	male 50	Brown eye	Detached retina	2 weeks	Cont. atrop. $\frac{1}{4}\%$ ^{in eye} Inj. of Filoxospine Subcutaneous (gtt) once daily	Puncture sclerotic behind detachment - Repaired at the end of one week.	Detachment of lower part of retina. After puncture, patient kept in bed several weeks - with post bandage over eye. Myopia = 5D. Very slight improvement - when discharged. V = fingers at $1\frac{1}{2}$ feet =
4	male 24	Blow on head	"	3 months	nil	nil	Large detachment of lower inner part of retina. Myopia = 3D. $V = \frac{3}{200}$. As detachment occurred 3 months ago, not gone worse since, no active treatment - advisable.
5	male 50	Blow on eye	"	6 months	"	"	V = shadow. Condition of the eye has remained the same for several months - myopia = 5D. Extensive detachment below -
6	male 51	Blow on eye	"	2 weeks	"	"	V = fingers. Small detachment of lower part of retina - also choroiditis. Patient kept at rest in bed - condition of eye remained the same -

No.	Age & Sex	Cause	Condition when seen	Time Elicited since injury	Course operative treatment	operative treatment	Result - Remarks -
9	male 33	piece of iron.	contusion of eyeball - redness of conjunctiva.	4 days	coll. Eye Throat.	nil	See 1. Light dim since injury - when first seen. $V = \frac{6}{60}$ (R) - $\frac{6}{6}$ (L) (H). with ophthalmoscope, nothing abnormal seen - $V = \frac{6}{24}$ (R). & on Dec 22 nd $V = \frac{6}{12}$ (R). but know whether further improvement - took place -
10	male 12	Blow with a cane	Dilatation of Lens Hypoaemia.	2 days	inst. Atropine bical.	-	Ed of Cane struck eye on inner side - around of conjunctiva, half an inch from the edge of cornea on inner side - no injury to sclerotic made out. Translucent iris - blended in anterior chamber. Pupil dilated to Atropine. Lens dilated laterally - edge of it - seen at inner margin of pupil when dilated. $V = \frac{20}{30}$ (H), & perception of light in R eye. with ophthalmoscope, see irregular crescentic patch of chloroiditis on outer side of optic disc, & one over the macula. Blow in anterior chamber disappeared iridodilation disappeared under Atropine drops. Lens to be removed if it does harm - but at present - not advisable to interfere -

Foreign bodies in the Eyeball.

In each of the two cases recorded here, the foreign body was a piece of steel.

In one case, it had been lodged in the eye for five years, during which time the patient's vision had gone, but there had not been any pain or irritation in the eye until one week before the patient was seen.

This case shows well, that a foreign body may remain in an eye for a long period without causing much discomfort to the person. In any eye containing a foreign body, a slight injury may cause sympathetic inflammation to be set up in the other eye.

There is nothing special to be said about the two cases here, some notes are given in the table; but I shall just mention how the foreign bodies were removed.

This was done by a magnet & by a pair of magnetised Iris forceps. In each case the magnet itself was first tried. & by this the position of the foreign body slightly altered; but to remove it the magnetised Iris forceps were found to be most useful.

When the foreign body is very difficult to remove (as in Case 1), the magnet & forceps may be tried alternately, as the one may succeed where the other has failed.

To far as I am aware, the use of Iris
forceps in this way has not been
advocated, but, from the small
experience of these two cases, I think they
will be found very useful if tried in
others -

Foreign bodies in the eyeball.

No.	Age & Sex	Cause	Condition when first seen	Time elapsed since injury	How operative treatment	Operative treatment	Remarks
1	Male H9	piece of steel	round of cornea, iris & lens. Steel reaching in the eye.	7 days.	Euth. atropine to die. (after operation)	Removal of foreign body by maguel and maguel's forceps.	Post- op. 1. Original wound in outer third of cornea - edge of foreign body - seen at inner margin of iris which partly covered it. Removed after making incision with Keratome at margin of cornea, just the end of the original wound. Size of steel = $\frac{1}{8}$ x $\frac{1}{16}$ inch - This seemed considerably mutilated - Lens becoming opaque. Pupil dilated well. Posterior capsule outside - 20 V = finger. Lens normal - Lens becoming opaque - atropine continued one day. Feb. 20 - Lens quite opaque - March 16. Soft-lens matter let out - Atropine three daily - 30. V = shadow - on account of capsule - which will be needed later on. Adhesion of iris & capsule to lens in cornea - no irritation - Atropine three daily -
2	Male 25	piece of steel	Do.	5 years.	Euth. atropine to die. (after operation)	Indecision - followed by removal of foreign body by maguel and maguel's forceps.	Eye began to inflame one week before seen - Sight gone completely - edge of steel can be seen - Lens opaque - Projection good. Seen at lower margin of cornea - After removal of steel - irritation subsided, eye quite settled now. Seen several months after - Now, projection not good - no further reflex - Probably haemorrhage into vitreous humor, therefore no further operation advisable -

In conclusion I may briefly state that the points which I wish to emphasise in this paper are:-

- 1 The method of dealing with cases of injury to the conjunctiva when seen early, by passing a probe daily, between the opposed injured surfaces.
- 2 The frequency of sloughing ulcers of cornea in a colliery district; their causation.
- 3 The treatment of sloughing ulcers by the local application of Quinine.
- 4 The value of the actual cautery, in arresting the spreading of a sloughing ulcer.
- 5 The advantages of letting out hypopion by a vertical radial incision in the cornea.
- 6 The operation of Capsulotomy, where, after injury to the lens, the capsule remaining is very dense.
- 7 The value of double iridectomy, after wounds of eyeball involving the cornea & Iris, or Ciliary region.
- 8 The use of magnetised Iris forceps, for removing pieces of steel from the interior of the eyeball.