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THE RESULTS OF OPHTHALMIC OPERATIONS

The Middlemore Lecture, delivered at the Birmingham
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BY

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RICHARD MIDDLEMORE founded this lecture with intent that it should be of service to the general practitioner, rather than a scientific discourse upon some severely scientific subject.

The results of general surgery, both immediate and remote, are well known to the doctor in general practice; he is able, with knowledge born of experience, to advise his patients who have to undergo operations. He is well aware that the outcome of any surgical intervention must be judged, not by its immediate local success or failure, but by its ultimate reaction upon the general well-being of the patient. In not a few cases, an operation, successful from the standpoint of the surgeon, has a lamentable effect upon the mental outlook of the patient.

In ophthalmic surgery the general practitioner is not in the same happy position; his personal experience is generally slight; he is compelled to rely upon the specialist he asks to help him. For this reason I have chosen the *Results of Eye Surgery* as the subject of this lecture. I wish to survey the results of the most important operations, and to study the conditions which influence them for better or for worse. I am relying upon my personal experience, gained during the past 27 years in this country and in Palestine. The majority of my operations have been performed at the

Birmingham Eye Hospital, and at the Coventry and Leamington General Hospitals. Whereas the conditions vary in these institutions, and the class of patient is not quite the same, useful information can be gained by a comparison of the results obtained in each.

Cataract Extraction

The main interest in eye surgery has always centred round operations for the extraction of senile cataract; success is almost dramatic; and makes a strong appeal to the public; failure is tragic both for the surgeon and his patient. The results of cataract extraction can be expressed in figures, hence an analysis of a series of extractions is a measure of the efficiency of the work performed.

Extraction is by far the most difficult of all the operations upon the eye, probably the most exacting of all surgical procedures. Success demands reasonable dexterity on the part of the surgeon, intelligent co-operation by the patient, and first-class nursing. Of all ophthalmic operations, extraction, with its wide incision close to vascular structures of the highest importance to the integrity of the organ, is most liable to infection, with loss of sight, either from a frank suppuration, panophthalmitis, or not less surely from a low-grade inflammation of the pigmented structures of the eye, the iris, ciliary body, and choroid. A further terror is sympathetic ophthalmitis, which, often when least expected may rob the patient of the sight of both eyes. Operations for cataract may be followed by mental derangement, transient or permanent. About 2·5 per cent. of my patients have shown mental symptoms, three of whom died from acute mania, and two committed suicide.

The results of extraction are influenced by four factors: the skill of the surgeon; the character of the nursing; the behaviour and condition of the patient, and the nature of the environment.

The skill of the surgeon is not all-important. An operator of great manual dexterity who is careless about the general condition of his patient, and who is not backed up by good nursing, will not get such a high average of success as the good ordinary man who takes pains to see that all possible sources of infection are treated before the operation, and is happy in the help of a good sister. A surgeon with long experience will get out of a difficult situation which would be fatal to a beginner, and a really bad operator will have many failures. A skilful operator with light hands will obtain a high percentage of first-class results, but good organization reduces the number of total failures, so in the long run the average man who takes trouble will get many good results and few failures.

The character of the nursing is of vital import. A clever sister leads her patients to the operating table in a quiet and optimistic

frame of mind, they lie as though under general anaesthesia, and it is rare for the surgeon to be troubled with a case of squeezing. On the other hand a sister with little experience of eye work may, with the best intention in the world, bring her patient to operation in an anxious frame of mind. He is fearful and nervous, and may ruin the surgeon's work by his inability to keep still and avoid squeezing. At the Birmingham Eye Hospital and at the Coventry Hospital, where the sisters are specialists in eye work, the loss of vitreous, which is an index of the patient's behaviour, is 6·5 per cent. At the Warneford Hospital, where the eye cases are nursed in general wards the figure is 17 per cent. We shall see later on that there is another cause for this complication, and as a set off we must state that during the past 12 years not a single eye has been lost after an eye operation in this institution.

The condition of the patient is probably the most important factor in success. It is obvious that a thoroughly unruly man may spoil his operation on the table. Such tragedies are infrequent in this country, but in Palestine they were more common. I have known a patient give a tremendous squeeze the moment the incision was completed and project his lens on to his chest, with large loss of vitreous; fortunately the recuperative power of these people is so great that the majority recover with adequate acuity of vision.

Infection of the eye may come from within or from without. External infection springs from the lacrymal sac and the conjunctiva, and from the mouth of the surgeon if he does not wear a mask. Actual suppuration is almost always due to pneumococci derived from the lacrymal sac. A careful investigation of the lacrymal passages is made before operation, and if there is pus in the sac it is excised before the major operation. Cultures from the conjunctival sac should afford some protection, but unfortunately practically all my cases of panophthalmitis have given sterile cultures.

Although it is a dangerous doctrine to preach, I feel confident that some of the cases of low-grade cyclitis are due to endogenous infection. Common sources are; the teeth, tonsils, nasal sinuses, ears, abdominal foci such as the gall bladder, bacilluria and pelvic infection. Rarer foci are suppuration under a toenail, umbilical sepsis, pus formation under a bunion, whitlows and boils. All these conditions have in my practice caused inflammation of the eye apart from any operation, and must be excluded before the globe is opened.

The general health of the patient is of great importance. A case of leucaemia was overlooked, and the eye was lost from cyclitis. Another patient had a large uterine fibroid and she did none too well. During the years 1917 and 1918 I extracted 40 lenses at the Birmingham Eye Hospital. 17·5 per cent. of

the eyes came to excision. During the years 1920 to 1930 only 3·3 per cent of 60 extractions were excised. That is to say, that during the former period the loss after extraction was five times what it should be. I think that the cause of the failures is that the years in question were at the end of the great war. The patients were often badly nourished, worried, and anxious, and bad cases for operation. Further, the hospital was understaffed and the investigations previous to operation could not be carried out as thoroughly as they are in normal times.

Diabetes.—Uhthoff stated that the results of extractions in diabetics are as good as in the sugar-free. My own experience does not substantiate this view. It is true that the majority of diabetics do well, but the tendency to inflammatory reaction is definitely greater than in normal patients. During the past three years at the Coventry Hospital we have lost only one eye among about 700 operations of all kinds. This was a female diabetic. I extracted her lens and six months later I had to excise the eye. It is my practice to put these patients upon a Graham diet and to operate only when they are sugar-free.

The general temperament of the patient is very important. A patient who sits up with a knife threaded through his eye cannot expect success. The high percentage of vitreous loss at the Leamington Hospital is partly due to the fact that many of the patients come from remote country districts. Quite half the patients are difficult and unsteady, and although in all cases novocaine was injected to paralyze the facial nerve, many of them were bad squeezers. The average agricultural labourer is a worse cataract patient than the town-dweller.

The environment of the operation.—The operation may be performed at an eye hospital, in the special eye-wards of a general hospital, in the ordinary surgical or medical wards, in a nursing home, or at the patient's own home. From 1910 to 1918 my patients at the Warneford Hospital were housed in the surgical wards. Fifty extractions were done, and seven eyes were subsequently excised. During the past 13 years the eye patients have been admitted to the medical wards, and the cataracts have been in side-wards. In this period 30 lenses were removed and not one eye was excised. Ninety per cent. obtained useful acuity. It is obvious that in a surgical ward the risk of infection is great, and that the eye patients are disturbed and frightened by the horrors they see and hear. Patients who are admitted to eye-wards have the opportunity of talking to others who have already been through the operation. They are told that, "they have nothing to fear," and approach the ordeal with confidence. There is virtue in the "ophthalmic atmosphere." I regard a nursing home, unless it is specially organized for eye work, and has ophthalmically trained

nurses, as unsuitable for eye operations. Generally, the patient is put upon the same table that has been used for septic operations, and is nursed by those without special training. If I cannot place my private patients into one of the private-wards of an eye hospital I prefer to operate in their own homes. I have done this several times, occasionally in small, not overclean cottages, and not one of these patients has caused me the slightest anxiety.

Statistics—1920 to 1930

I have analyzed the records of my extractions for the last ten years at the three institutions previously mentioned with the following results:

Birmingham Eye Hospital.—60 eyes. Useful acuity: 70 per cent. Failure: 10 per cent. Excised: 3·3 per cent. No record: 20 per cent.

Coventry Hospital.—107 eyes. Useful acuity: 90 per cent. Failure: 5·6 per cent. Excised: 1·9 per cent. No record: 3·8 per cent.

Leamington Hospital.—30 eyes. Useful acuity: 90 per cent. Failure: 3·4 per cent. No record: 6·7 per cent. Excised: 0 per cent.

Private Patients.—60 eyes. Useful acuity: 95 per cent. Failure: 5 per cent. Excised: 3·3 per cent.

The low percentage of success recorded at the Birmingham Eye Hospital is largely accounted for by the fact that in 20 per cent. of the cases the notes gave no indication of the result obtained. In most cases the patient did not reappear after his discharge, and no refraction had been done. Probably many of these patients were satisfied with the vision they obtained without glasses, and if we add three-quarters of them to our list of successes we get 85 per cent. of useful acuity. My colleague, Mr. Charles Rudd, then Surgical Registrar to the hospital, analyzed the cataract work of all the surgeons to the Birmingham Eye Hospital over a period of three recent years. He excluded all those cases in which the notes did not indicate the result of the operation. 162 eyes were included, 58 excluded. This method is obviously unfair to the surgeon because it greatly increases the percentage of loss and failure. Those patients whose eyes were excised were all in the list and probably the majority of those not included were more or less successful. The results were as follows:—Number of eyes: 162. Useful acuity: 87 per cent. Failures: 13 per cent. Excised: 6·2 per cent. (or excision recommended.) At *The British Ophthalmic Hospital, Jerusalem*, before the war I extracted 64 lenses with the following results:—Useful acuity: 93 per cent. Excised: 7·5 per cent.

Vitreous was lost in 17 per cent. The failures were due to : panophthalmitis : one case. Sympathetic ophthalmitis : one case. Excessive loss of vitreous : two cases. We must bear in mind that " useful acuity " in England and in Palestine are not synonymous terms. A Bedwân with an acuity without glasses of 6/60 would be perfectly satisfied ; " I was blind, now I see, *el hamd il Allah.*"

The good results obtained were largely due to the fact that in Palestine post-operative cyclitis was practically unknown.

Many of the cases classed as failures in my general statistics were in reality surgical successes. The poor acuity was often due to fundus disease, amblyopia, and other causes beyond the reach of the surgeon.

To summarize : a patient in reasonable health, operated upon by a surgeon of sufficient ability, well nursed under good conditions, has at least a 90 per cent. chance of obtaining good acuity after an operation for extraction of cataract.

Extraction of Dislocated Lenses

This operation is the most difficult form of extraction, so much so that in some cases it is almost impossible, and it may be necessary to abandon the operation.

Congenital dislocation is generally a familial fault, and may be classified with reference to the degree of development of the suspensory ligament. The condition of the zonule is of such prime importance from the operative standpoint that no treatment should be undertaken until the eye has been carefully examined with the slit-lamp. The sight is often so bad that something must be done to improve it.

The first stage is a preliminary iridectomy. This can be performed only with the iris-hook, for it is impossible to seize the iris with forceps. The coloboma is laid opposite to the visible edge of the lens.

If there is a perfect suspensory ligament, treatment had better end here, for it is practically impossible to remove the lens with success. If on the other hand the zonule is absent or very imperfect, extraction may be attempted. A corneal incision is made with Smith's knife across the axis of the coloboma, and the lens is removed with Taylor's vectis. There is generally considerable loss of vitreous, and a strong tendency for the iris to prolapse. Subsequent cyclitis is not uncommon.

I have notes of six operations of this kind. Four were successful, but in two cases the eye was excised, a loss of 33·3 per cent. In both these cases the zonule was well developed and the lens was removed piecemeal. There was in each case considerable loss of vitreous, the iris prolapsed, and a low-grade cyclitis compelled removal of a dangerous eye.

Traumatic dislocation.—If the lens has fallen into the vitreous and remains there, it is best left alone, and generally does no harm. These cases are not parallel with those of reclinatio*n* as practised in the East. A couched eye is an infected eye, and sooner or later chronic cyclitis sets in.

If the dislocated lens from time to time enters the anterior chamber, operation is essential, because it may become impacted and cause intractable glaucoma. Here again, if the lens is in the vitreous, preliminary iridectomy is advisable. The lens, if it is opaque, can now be removed from the vitreous. A large corneal section is made, and a strong beam of light directed upon the lens. It is gently drawn forward with the lens hook, a flat spoon is slipped behind it, and then it is expressed. Often there is no loss of vitreous. A transparent lens is not visible in the vitreous, and it is practically impossible to remove it. After an iridectomy the lens does not become impacted in the anterior chamber, and it is unwise to risk the loss of the eye by attempting to extract an invisible lens. When the lens is actually in the anterior chamber it is best to operate with the patient sitting in a chair, and often a downward section is best.

During the past ten years I have extracted four lenses from the anterior chamber. All the operations were immediately successful, but three of the patients never returned after their discharge and I have not been able to trace them. The fourth case made a good recovery with a corrected acuity of 6/18. Two lenses were removed from the vitreous without any loss of vitreous. Both left the hospital with quiet eyes, but neither returned.

The Birmingham Eye Hospital has now appointed an almoner to follow up operation cases.

Glaucoma

Secondary glaucoma.—Many conditions may cause a rise in the intra-ocular pressure; tumours, haemorrhages, and inflammation, may all be associated with glaucoma. Occasionally an eye from which a cataract has been removed may become unduly hard. Each case has to be treated on its merits, and the final result depends so much upon the condition present that it is impossible to give statistics of any value. An eye containing a tumour is always excised, and if this is done before the neoplasm has invaded the optic nerve, or perforated the sclera, local recurrence and dissemination are rare events. I can think of only three cases in which this took place. On the other hand, when the growth has passed beyond these prescribed limits, death is practically inevitable. It is possible that the use of radium after exenteration of the orbit, may save some of these patients. Early diagnosis is essential

and in doubtful cases, especially in children, it is wise to err on the side of safety.

Glaucoma following intra-ocular haemorrhage or thrombosis of the central vein is difficult to treat. I have succeeded in reducing the tension to normal by trephining, but the majority do very badly, and often the eye must be removed to relieve pain.

Glaucoma following a cataract operation is generally caused by the impaction of lens capsule in the wound. The iridic angle becomes blocked by cell proliferation, and the condition is very unfavourable. Nevertheless, some eyes do well after trephining.

Irido-cyclitis is often associated with glaucoma, in fact the eye may become stone-hard. Many cases recover under atropine and general treatment of the cause of the inflammation. In others the eye remains hard and an operation is necessary. There are unhappily many cases of glaucoma due to cyclitis that do not yield to any type of operation. It is difficult to decide whether to operate or not, and to choose the most suitable method. Generally speaking, an eye which will not get soft under atropine is not cured by an operation, which is indeed often but a forlorn hope. We should direct our energies to careful treatment of the cyclitis, and so avoid this dangerous complication. The worst case is a neglected sympathetic ophthalmitis. Early treatment with atropine and a full course of N.A.B. has in my hands given most satisfactory results. All my recent cases have recovered, but the slit-lamp must be used, and a very early diagnosis made.

When the whole ring of the iris has become luted to the anterior lens capsule by inflammatory exudate, the path of excretion is blocked. The aqueous accumulated behind the iris bulges it forward to form the well-known *iris bombé*. A small iridectomy lowers the pressure, but the visual result must depend upon the clarity of the media. If the anterior capsule is covered with pigment and exudate, it is obvious that the sight will remain bad, but in time absorption may take place with some restoration of vision. In this connection we may mention that class of recurrent iritis caused by the constant drag of adhesions. Here iridectomy is most satisfactory and is not performed as often as it should be.

Primary glaucoma.—Many cases apparently primary prove on examination with the slit-lamp to be really secondary. When, however, the original inflammatory basis has subsided for some years, or is of a very chronic low-grade type, we must for the purposes of treatment consider them to be primary.

Congestive or acute glaucoma.—The results of treatment depend to a very large extent upon the stage at which the patient presents himself. If an acute case be treated at once with eserine recovery is common, and this treatment should be tried before rushing to operation. Cases that do not react to conservative

treatment are often resistant or complicated cases and operation is not always successful.

The operation of choice is iridectomy, but the experience of the surgeon may teach him that the case is not likely to be cured by this simple intervention, and he may decide upon some form of sclerectomy. My statistics for trephining in acute glaucoma show a high percentage of failure, but this is in the main due to the fact that those cases submitted to the trephine were more severe than those selected for iridectomy.

Iridectomy probably effects its object by freeing the iridic angle from iris. For this reason it is unnecessary to remove a large area of the iris, the main thing is to excise the root of the iris. The old-fashioned, so-called, "classical iridectomy," where two-fifths of the iris was removed, is a brutal mutilation. A narrow iridectomy that reaches the base of the iris is equally efficient. My operation of *trap-door iridectomy* removes the base of the iris with safety and certainty. The operation is the same as trephining, with this exception: at the last stage of its work the trephine is inclined towards the patient's chin so that the disc is cut with a hinge. The iris prolapses, it is drawn out to its full extent, excised, and the trap-door of sclera is closed. This operation has several advantages: there is no danger of wounding the lens, there is no post-operative astigmatism, and the iris excision is peripheral, for the opening in the sclera is directly over the root of the iris. Incidentally, it is not unusual to get some definite filtration, which is all to the good. As far as I know there are no disadvantages.

Iridectomy may fail to reduce the tension, and further operative treatment may be necessary. After a trap-door iridectomy, we merely retrephine in the original situation, this time removing the scleral disc. If repeated operation fails to cure the glaucoma we must not overlook the possibility of an intra-ocular tumour, and it is generally wise to remove the eye.

Non-congestive glaucoma (glaucoma simplex).—In this insidious disease rise of tension is only one of the signs. In some cases, rare it is true, we note progressive loss of the peripheral field with a nasal step, enlargement of the blind-spot, increasing excavation of the disc, perhaps some loss of central acuity, unaccompanied by any rise of intra-ocular pressure, as measured by the tonometer. Not infrequently similar progressive deterioration is noted after the tension has been reduced by operation to normal or even to sub-normal. It is meddlesome surgery to operate when repeated determinations with the tonometer fail to reveal any rise of intra-ocular pressure. I emphasize the use of the tonometer, because testing with the fingers gives erroneous results.

The outcome of surgery for glaucoma simplex depends upon early operation. When once we have decided that the disease is

present, and that it is beginning to cause loss of function, then operation is imperative. A certain class of case can be kept in check with miotics, but such must be constantly watched, the visual fields should be investigated frequently and the visual acuity tested. Glaucoma simplex is a treacherous disease; we may observe a case for months and find no deterioration, and then *perhaps in a few weeks*, the discs become deeply cupped, and the fields contract. Another danger is the formation of a central scotoma (Bjerrum and Siedl), which, without any warning, invades the fixation spot, and causes permanent loss of central vision.

The old-fashioned iridectomy introduced by von Graefe, was a notable advance in treatment, but it cures only about 40 per cent. of the cases, and most of these have a filtering scar. Modern operations attempt by various methods to form a permeable cicatrix.

Trephining is the favourite operation in this country, but it is not popular on the Continent, and it is losing ground in America. There is no doubt that a very large number of cases are cured. I have patients whom I trephined 15 years ago who still have good sight and full fields. Some years ago I analyzed the results of a large number of my operations for glaucoma. I found that 75 per cent. of the trephining operations were successful. My present series of 50 patients gives 70 per cent. There is, unfortunately, another side to the shield. The failures after trephining are apt to be serious, and there are among them several total losses. The anterior chamber may remain unfilled for a long time, and nuclear cataract develops. Apart from late formation of the chamber, cataract is a frequent complication. Post-operative iritis is very common, generally it is slight, but it may be serious. A large percentage of the successful cases develop an ectatic cicatrix. This is not only very unsightly, and uncomfortable, but it is a definite source of danger. An eye with a weak scar is liable to infection. *Late-infection*, starting a year or more after the operation, is occasionally seen. Fortunately, it generally yields to treatment, but the infection is recurrent, and about 1 per cent. of eyes submitted to the trephine are lost by a late-infection. During the past five years I have more and more given up trephining for the operation of *iridencleisis* or iridotaxis. An incision is made in the conjunctiva about 10 mm. from the limbus, and a pouch is made with scissors. A narrow keratone is entered about 3 or 4 mm. from the limbus, and a long slanting passage is made into the anterior chamber. The iris is seized at the sphincter with Matthieu's forceps, which open easily in a narrow channel, and the iris is drawn out. The sphincter is incised with scissors, and the iris left prolapsed under the conjunctiva. I have collected the notes of 25

cases of glaucoma simplex treated by iridencleisis. Eighty per cent. have been successful, that is to say, the tension was permanently reduced to normal, and there have been no losses. No case developed cataract. On the other hand it is only fair to say that the cases that have been treated by iridencleisis have on the whole been of a milder type than those that were trephined. I have selected my cases, some for the trephine others for iridencleisis. Again, few of the cases have been watched for more than five years. Some of the unsuccessful cases have been subsequently trephined with success. It has been urged that iridencleisis is a dangerous procedure, one likely to cause sympathetic ophthalmitis. So far, I have had no trouble of this kind, and I know of no recorded case of sympathetic inflammation. The operation in one form or another has for many years now been employed on the Continent and in America, and is most enthusiastically recommended by Colonel Herbert. Iridencleisis causes very little reaction, no more than an ordinary preliminary iridectomy. This is in strong contrast to trephining, which is always followed by considerable injection and irritation. The dangerous and unsightly blebs that we have mentioned after trephining are very rarely seen. When the anterior chamber is very shallow it is so difficult and dangerous to insert the keratome that I prefer to use the trephine and avoid the possibility of wounding the lens.

Other methods of sclerectomy, such as the Lagrange, are equally successful in the hands of those who have specialized in the technique.

Strabismus

An operation for squint is performed only when other methods of treatment have failed to cure the deformity. The child has worn a correction for his hypermetropia for at least a year, amblyopia has been treated by complete occlusion of the better eye, and perhaps fusion training may have been tried. In the majority of cases that I have operated upon, the angle of convergence has been 30 or more degrees, often 40° or more. I have found that the optimum age is eight: most children of this age are sensible enough for local anaesthesia to be used. Older children are apt to be apprehensive, and I find that more children over eight require general anaesthesia than those under this age.

In by far the larger number of my operations I have attacked both the external and internal recti. In adults, when the angle of deviation is small, advancement of a lateral rectus has been sufficient, but in children the pull of the medial rectus tends to make the advancement sutures cut out, and the operation fails. In older persons the sclera is tougher, and the stitches remain in position.

Tenotomy is a thoroughly bad, unsurgical procedure, and for the past 10 years or more I have given it up. It should be obvious that the result of cutting a tendon and allowing it to re-attach itself where it likes must be uncertain. In effect many eyes that have been treated in this manner diverge, and in a very large number muscle tests show insufficiency of convergence.

Recession, an operation where the tenotomized muscle is re-attached to the sclera in the desired situation is far better both in theory and practice.

Statistics—1920 to 1930

I have collected the records of 75 operations for convergent strabismus. I have actually operated upon a much larger number, but in many cases the final result was recorded, not on the hospital notes, but at the Coventry School Clinic. It would have been possible to collect the cards, but I did not wish to give the school nurse the immense amount of trouble necessary to find them, extending as they do over a large number of years.

Recession and advancement.

Number of cases	50
Successful	90 per cent.
Divergence	0 per cent.
Convergence insufficiency	2 per cent.
Average effect	28°

Tenotomy and advancement.

Number of cases	23
Successful	75 per cent.
Divergence	14·4 per cent.
Average effect	26°

It is obvious from these figures that recession is far better than tenotomy of the internal rectus.

In 1916, I analyzed the results of 75 operations for squint performed at the Coventry and Leamington Hospitals with the following results :—

Average initial convergence	14°	
Average age	10 years.	
Average effect	27°	
Complete success	50 per cent.	} 87 per cent.
Partial success	37 per cent.	
Failure	12 per cent.	
Divergence	5 per cent.	

Practically all these operations were tenotomy and Worth's advancement. I now use a far simpler and better method of advancement. (The full paper will be found in the *Ophthalmoscope*, Vol. XIV, p. 636.)

It is interesting that in both series, using different methods, the average effect of the operation is 27°. Roughly, one may say that an advancement gives 15° and tenotomy or recession an equal

amount. Hence, if the initial convergence is 45° , we may expect a residual convergence of 15° , and it is often necessary to operate upon both eyes.

There is a definite tendency for a convergent squint to undergo spontaneous cure, so a slight convergence after an operation may be expected to disappear after a time, and in effect it does so. On the other hand, if one eye is amblyopic, and there is no desire for fusion, an eye in good position after an operation may diverge in course of time. It is therefore no detriment if there is some residual convergence after operation, and I have classed those cases with slight residual convergence as successful.

Excision of the Lacrymal Sac

I have not taken out the statistics of this operation. I have performed it probably four or five hundred times and the results have been excellent. In a very few cases persistent lacrymation has been troublesome after the operation. In these cases I reopen the operation area and generally find sclerosed tissues and occasionally some remnants of the sac which have been keeping up the irritation. Occasionally a collection of pus has formed in the lacrymal fossa, and re-operation has discovered what appears like a new sac, really a lined abscess cavity. When this is removed there is no further trouble.

I have no experience of Toti's operation, but I have sent some of my cases to a rhinologist for West's operation. Some of these have been unsatisfactory, and others have passed out of my ken, but on the whole I have not been impressed with the results. At the Oxford Congress in 1929, Professor Meller, of Vienna, opened the discussion on the treatment of lacrymal disease. He treated the matter very judiciously, and came to the conclusion that: if the ophthalmologist has at his service a rhinologist *who has perfected the very difficult technique of the operation*, he will do well to refer to him selected cases of lacrymal suppuration, otherwise, excision is the best procedure.

The Removal of Foreign Bodies from the Eye

If the foreign body is *non-magnetizable* it can be removed only when it is visible. In practice this means that it must be in the anterior chamber. Cilia are occasionally seen in this situation, generally lying on the iris. In most cases they have entered through an actual wound in the cornea, but I recollect one case in which no opening could be found. The eye had been struck by a heavy chain, and two lashes were seen on the iris. It is not difficult to make an incision with a keratome and pick them out with fine forceps, but they may do little if any harm, and I have in two recent

cases left them alone. Bits of stone after quarry explosions are in the main well tolerated. Fragments of glass are very difficult to remove, and if sterile are often retained without irritation. Some things can be washed out, others picked out, many resist all efforts to dislodge them.

Magnetizable foreign bodies, spicules of iron, and most varieties of steel, are extracted with the giant magnet. The Mellinger Ring Magnet is the most practical instrument, but the Haab is the most powerful. I have removed seven or eight bits of steel with the Haab that resisted the Mellinger. Fortunately both at Birmingham and at Coventry I have the two.

The results depend upon three factors: the cleanliness of the fragment, its size, and the condition of the lens. A septic fragment may infect the eye, which is at once lost from suppurative endophthalmitis, or later from chronic uveitis. Fortunately, the majority of metallic foreign bodies are sterile. A large mass of metal may cause so much mechanical damage that there is no hope of saving the eye. If the lens is wounded there is a greater tendency to inflammation and cataract develops. This is often localized, but the whole lens may become opaque, and have to be removed.

If the fragment is small, and sterile, and has not wounded the lens, the results are in the main excellent. Even when cataract develops and the lens has to be evacuated, it is the rule to obtain good vision. Sometimes the fragment will not come forward by the ordinary Haab technique, and has to be extracted through a scleral incision. These patients as a rule do well, but some of them lose their sight later on from detachment of the retina.

It has been impossible in the time at my disposal to do more than consider the results of the chief operations upon the eye. Taken as a whole they are at least as good as those obtained in any other branch of surgery. Probably not more than 0·25 per cent. of the operations which open the globe are followed by suppuration, and well over 95 per cent. are successful in the surgical sense. The remarkable freedom from suppuration shown by wounds of the eye, whether surgical or accidental, is due to the fact pointed out by F. Ridley, a Birmingham graduate, that the tears contain a lysozyme which is a very powerful bactericide. Continued lacrymation diminishes the amount of this substance in the tears, and for this reason I deprecate any pre-operative treatment which causes a flow of tears. I believe that the use of strong antiseptics so favoured by the Indian school of ophthalmologists is harmful. I now simply wash out the eye with normal saline before an operation, and my present results are better than they were when I used antiseptics. If the eye is free from mucus it is probably better not to wash it out at all. Nature has provided the antiseptic and it is an excellent one.

STATISTICS OF OPERATIONS.

GLAUCOMA, 1920 to 1930.

Total number of cases	...	...	...	...	...	128
<i>Chronic glaucoma</i>	-	Number of cases	...	...	...	75
<i>Iridencleisis</i>	-	Number of cases	...	...	...	25
		Successful	...	...	...	82 per cent.
		Cataract	...	...	...	0 per cent.
		Excision	...	...	...	0 per cent.
<i>Trephining</i>	-	Number of cases	...	...	...	50
		Successful	...	...	...	70 per cent.
		Cataract	...	...	...	10 per cent.
		Excised	...	...	...	4 per cent.
<i>Acute glaucoma</i>	-	Number of cases	...	...	...	53
<i>Trap-door iridectomy.</i>		Number of cases	...	...	...	15
		Successful	...	...	...	80 per cent.
		Excised	...	...	...	1'9 per cent.
<i>Iridencleisis</i>	-	Number of cases	...	...	...	10
		Successful	...	...	...	100 per cent.
<i>Trephining</i>	-	Number of cases	...	...	...	26
		Successful	...	...	...	54 per cent.
		Excised	...	...	...	24 per cent.*
<i>Iridectomy</i>	-	Number of cases	...	...	...	2
		Successful	...	...	...	100 per cent.

* Many of these were severe, neglected, or complicated cases.

300 EXTRACTIONS (1920 to 1930).

Visions :

6/6	...	...	16'0 per cent.	} 57 per cent.	} 83'3 per cent. useful acuity.
6/9	...	...	22'3 per cent.		
6/12	...	...	18'7 per cent.		
6/18	...	...	14'3 per cent.		
6/24	...	...	8'3 per cent.	} 26'3 per cent.	
6/36	...	...	3'7 per cent.		
6/60	...	...	1'7 per cent.	} 9'7 per cent.	9'7 per cent. failure.
<6/60	...	...	3'3 per cent.		
Excised	...	...	4'7 per cent.		
Unknown	...	...	7'0 per cent.		

In all probability the majority of the patients with unknown results obtained useful acuity. If we add them to the successful cases we get the following figures :—

Successful	...	...	...	...	...	90 per cent.
Failure	...	...	...	...	...	10 per cent.

Analysis of causes of excision.

Number of eyes	...	...	...	...	...	300
Excised	...	...	...	...	...	14 = 4'7 per cent.

Panophthalmitis. 4 cases = 1'3 per cent.

- A bad squeezer, large loss of vitreous.
- Became maniacal after operation. Got out of bed and pulled his bandages off.
- Operation in a nursing home under bad conditions.
- Cause not found, sterile culture, normal operation.

Irido-cyclitis. 10 cases = 3·3 per cent.

- (a) No known cause.
- (b) Diabetes. (Eye excised six months after the operation.)
- (c) Paranoia and acute mania. Violent squeezer. Lost much vitreous.
- (d) Septic gall bladder.
- (e) Leucaemia. Very large spleen.
- (f) Vectis extraction, but no loss of vitreous.
- (g) Prolapse of iris, developed sympathetic ophthalmitis.
- (h) Nasal sinus disease. Polypi in nose.
- (i) Mania. Bad squeezer. Lost much vitreous.
- (j) Diabetes.

500 EXTRACTIONS PERFORMED IN ENGLAND (1907 to 1930).

Combined extraction	19·4 per cent.
After preliminary iridectomy	77·4 per cent.
Simple extraction	3·2 per cent.
Discission	20 per cent.
Vitreous loss	6 per cent.
Iris encleisis	7 per cent.

Visions :

6/6	17·0 per cent.	} 57·6 per cent.	} 85 per cent. useful acuity.
6/9	20·8 per cent.		
6/12	19·8 per cent.		
6/18	14·2 per cent.	} 27·4 per cent.	
6/24	8·6 per cent.		
6/36	4·6 per cent.	} 11·0 per cent.	} 11·0 per cent. failure.
6/60	2·2 per cent.		
<6/60	3·2 per cent.		
Excised	5·6 per cent.		
Unknown	4·0 per cent.		

PRIVATE EXTRACTIONS.

Number of lenses extracted... ..	60
Combined extraction	60 per cent.
After preliminary iridectomy	36·7 per cent.
Simple extraction	3·3 per cent.
Discission	21·7 per cent.
Vitreous losses... ..	1·7 per cent.
Iris encleisis	5·0 per cent.

Visions :

6/6	28·3 per cent.	} 76·7 per cent.	} 95·0 per cent. useful acuity.
6/9	31·7 per cent.		
6/12	16·7 per cent.		
6/18	11·6 per cent.	} 18·3 per cent.	
6/24	5·0 per cent.		
6/36	1·7 per cent.	} 5·0 per cent.	} 5·0 per cent. failure.
6/60	1·6 per cent.		
Excised	3·4 per cent.		

It is useful to note that the loss of vitreous in private patients is only 1·7 per cent. compared with 6 per cent. in hospital patients.

EXTRACTIONS AT THE BIRMINGHAM EYE HOSPITAL (1920 to 1930).

Lenses extracted	60
Combined extraction	16·6 per cent.
After preliminary iridectomy	83·4 per cent.
Discission	16·6 per cent.
Vitreous loss	6·6 per cent.
Iris encleisis	8·3 per cent.

Visions :

6/6 ...	10'0 per cent.	} 50 per cent.	} 70 per cent. useful acuity.
6/9 ...	15'0 per cent.		
6/12 ...	25'0 per cent.		
6/18 ...	11'6 per cent.	} 18'2 per cent.	
6/24 ...	1'6 per cent.		
6/36 ...	5'0 per cent.		
6/60 ...	1'8 per cent.	} 11'8 per cent.	} 11'8 per cent. failure.
<6/60 ...	6'7 per cent.		
Excised ...	3'3 per cent.		
Unknown ...	20'0 per cent.		

If 15 of the 20 per cent. unknown results be added to the successes we get roughly:

Successful ...	85 per cent.
Failure ...	12 per cent.

EXTRACTIONS AT THE COVENTRY HOSPITAL (1920 to 1930).

Lenses extracted ...	107
Combined extraction ...	16 per cent.
After preliminary iridectomy ...	74 per cent.
Simple extraction ...	10 per cent.
Discission ...	17 per cent.
Vitreous loss ...	6'5 per cent.
Iris encleisis ...	10'0 per cent.

Visions :

6/6 ...	17·6 per cent.	} 62·6 per cent.	} 90 per cent. useful acuity.
6/9 ...	30·0 per cent.		
6/12 ...	15·0 per cent.		
6/18 ...	12·1 per cent.	} 28·0 per cent.	
6/24 ...	11·2 per cent.		
6/36 ...	4·7 per cent.		
6/60 ...	0·9 per cent.	} 5·6 per cent.	} 5·6 per cent. failure.
<6/60 ...	2·8 per cent.		
Excised	1·9 per cent.		
Unknown	3·8 per cent.		

EXTRACTIONS AT THE LEAMINGTON HOSPITAL (1920 to 1930).

Lenses extracted ...	30
Combined extraction ...	23'4 per cent.
After preliminary iridectomy ...	73'4 per cent.
Simple extraction ...	3'2 per cent.
Discission ...	34 per cent.
Vitreous loss ...	17 per cent.
Iris encleisis ...	13 per cent.

Visions :

6/6	13·4 per cent.	} 46·8 per cent.	} 90 per cent. useful acuity.
6/9	16·7 per cent.		
6/12	16·7 per cent.		
6/18	23·4 per cent.	} 43·4 per cent.	
6/24	20·0 per cent.		
6/36	0·0 per cent.		
6/60	3·3 per cent.	} 3·3 per cent.	} 3·3 per cent. failure.
Excised ...	0·0 per cent.		
Unknown ...	6·7 per cent.		