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BY

SMALL ANGULAR FLAP AND THE

LOWER SECTION.

BY

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ON THE EXTRACTION OF CATARACT BY SMALL ANGULAR FLAP AND THE LOWER SECTION.

THE very general adoption by modern ophthalmic surgeons of Graefe's linear operation for the extraction of cataract might lead to the assumption that the evidence in favour of its superiority over all other operations for the same purpose is conclusive. The fact, however, that so many modifications of the original operation exist, each operator in extensive practice having almost invariably some modification of his own, shows that whilst the general principle may be accepted, the details are still under discussion.

The linear method, of which it was once written "nothing now remains of the original operation but the knife," presents enormous advantages when compared with the old flap operation, but has in turn some marked imperfections. This view has impressed itself strongly upon the minds of many ophthalmic surgeons, and repeated attempts have been made to effect a compromise. Bader, Warlomont, Liebreich, and others, have devised operations which they intended should possess the cosmetic advantages of the flap operation combined with the greater safety of the linear method.

To these operations there are some grave objections, which I shall consider later. But that such a compromise is what is needed, there can, I think, be no doubt. That the relatively perfect results of the flap operation, when completely successful, added to the enormously increased percentage of successes achieved by the linear

method, is the aim to be realised must be admitted. So far, however, I believe no procedure has been adopted which satisfactorily accomplishes this end, and I am induced, therefore, to lay before my professional brethren the results of my reflection and practice, feeling that a real step has been gained towards the production of the combination desired.

It is by no means difficult to understand why the linear method superseded the old flap operation. The large area of the cornea included in the flap and the direction and character of the incision, produced an unavoidable tendency to gaping of the wound, which augmented the risk of accident during the performance of the operation and subsequently interfered with perfect apposition of the edges of the wound. To the latter cause must be referred the retarded union, so frequent in flap operations, to which, and not as was formerly believed, to the feeble inclination of the corneal tissue to repair, was due the frequent loss of eyes from suppuration.

The linear method presents the great advantage of a small wound having but little tendency to gape even in violent movements of the eyeball during operation, and predisposing, by the ready apposition of its edges to early union. To this closing of the wound is indisputably due the small number of eyes lost by suppuration, and this constitutes the only excellence of the linear method. It was formerly thought that the site of the incision, which in the early days of the linear section was in great part in the sclera or corneo-scleral junction, was by its supposed better basis of nutritive supply, the chief cause of the diminution of suppurations. This has been proved to be erroneous, and now all linear incisions are made for the greater part, if not entirely, in the cornea proper. The lessened tendency of the incision to gape is therefore the one excellence of the linear operations.

Its disadvantages are many. As an operation it is

complicated and difficult. The upper section is especially enjoined. The marginal position of the incision, its linear direction and its reduced extent, render it impossible for the cataract to escape by passing over the iris, as in the flap operation. An opening is necessitated through the body of the iris. In order to perform iridectomy, and to carry out the succeeding steps of the operation, the great retraction of the upper eyelid required to keep the upper section within sight and reach, calls for the use of the speculum or retractor, oftentimes throughout the whole operation. The pain thus produced and the frequently prolonged duration of the operation, owing to the comparative difficulty of removing cortical *débris* through an upper section, render the use of an anæsthetic advisable, and in most cases imperative.

These and other objections to the linear method, as ordinarily employed, led to the devising of the operations which I have called compromises. Of these, those which have found most favour are probably Bader's, Warlomont's and Liebreich's. These operations have undoubtedly the advantages of being easy of performance and of comparing favourably, so far as total loss of eyes from suppuration is concerned, with the modified linear operations. There are, however, against them two main objections. First, that the iris is very frequently incarcerated in the incision. This, in addition to its disturbing effects upon vision, is a source of immense danger to the eye operated upon, on account of the destructive changes which such adhesions bring in their train. And second, that incisions passing across the cornea near to its horizontal diameter, must, on healing, produce considerable alteration in the curvature of the cornea, and so cause astigmatism of an irregular kind, rendering the transmission of a well defined image to the retina impossible. For these two reasons, the dangerous results of adhesions of the iris to the cicatrix, and the altered curvature of the cornea, these

operations have not, in spite of their simpleness, satisfied the want felt.

In 1868* Dr. Bell Taylor of Nottingham, described an operation in which an incision was employed, which I have come to regard, after much consideration, as possessing the essential characteristics of a good incision.

Having made this acknowledgment I will proceed to describe the method of extraction which I have adopted, premising that the incision therein employed differs from that described by Dr. Taylor in being wholly corneal, instead of being in part situated in the corneo-scleral junction, and also in the direction given to the knife in the latter portion of the incision†.

I am not accustomed to use any preliminary treatment with cataract patients as a matter of routine. I am satisfied to be sure that the patient is in fair general health.

If the tension of the eyeball be normal or slightly below normal, and the pupil dilate readily, I cause a strong solution of atropia to be instilled two or three times, not later than an hour before operation, so as to lessen the resistance of the sphincter of the pupil. If the tension of the eyeball be higher than normal, or the pupil do not dilate readily, I make an iridectomy. As the question of iridectomy is a very important one I shall discuss it later on.

Unless the patient be of a very nervous, sensitive temperament I do not employ an anæsthetic. And even in these cases I am generally accustomed to deaden sensation by means of a good dose of chloral about half an hour before operation, rather than complicate matters with an anæsthetic.

The patient lies in the recumbent posture, on a couch

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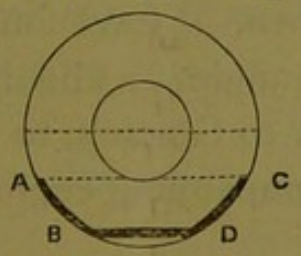
* Edinburgh Medical Journal, 1868.

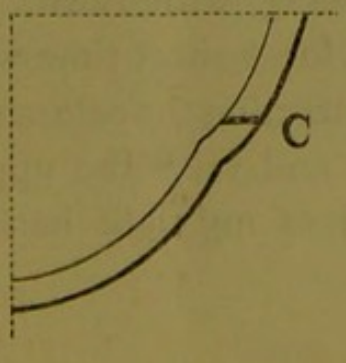
† I do not claim to have done more than select what appears to me the most suitable incision. He would be a bold man who, in these days, should claim to have invented a new incision for cataract extraction.

or bed of such a height from the ground that I can conveniently sit by his side. The bed is placed near to a window, having its left side towards the light. I sit facing the patient on the left side of the bed, and maintain this position during operation on each eye, using the knife for incision with the right hand for the left eye, and the left hand for the right. The eyelids are kept moderately apart by means of a speculum. The eye is firmly held by means of a pair of ordinary fixation forceps, grasping the conjunctiva and sclera about over the upper edge of insertion of the internal rectus muscle. I then proceed to make the section which occupies about the *lower* third of the cornea. A small and very narrow Graefe's knife is entered at the corneal margin, parallel to the plane of the iris, just about on a level with the junction of the middle and lower thirds of the cornea. The knife is made to pass directly into the anterior chamber, carefully avoiding a slanting direction between the corneal layers.

Thus, in the diagram, supposing the right eye to be



operated upon, the knife would be entered at A, passed across the chamber, and emerge at C; then, by a quick, sawing motion, the incision is carried downwards in the corneal margin, parallel with the plane of the iris, to the points B and D. The blade of the knife is then turned directly upwards, so as to form, if possible, an angle of 85° with the plane of its earlier course, as in diagram C,



and in this position is made to cut its way out in a straight line. This done, the speculum is at once removed and laid aside, the position of the incision, with the aid of the unavoidable tendency on the part of the patient to roll the eye upwards, rendering fixation by forceps and the use of the speculum in the later stages of the operation unnecessary. The lids are then closed, and a piece of cotton wool, wetted in cold water, laid over them for a few seconds.

The upper lid is then gently raised by an assistant, and, if iridectomy be necessary, the iris forceps are used with the left hand for each eye. If iridectomy be not necessary, the capsule of the lens is lacerated in the following manner :—the upper lid being well fixed by the assistant, I depress the lower lid slightly with the fingers of the left hand for the left eye, and those of the right for the right eye, and pass the cystitome between the lips of the wound, resting my hand upon the patient's cheek, so as to allow of free play of the thumb and first two fingers, much as in using a pen. I have found a cystitome bent so as to form an angle of about 150°, and having a cutting point, similar to Graefe's, to be most useful—such as shown in the accompanying engraving.

The point of the cystitome having been passed under the upper margin of the pupil is made to cut its way downwards in such a manner, that, as far as possible, the central part of the capsule shall be destroyed, and the lower part freely lacerated.

The cystitome being withdrawn, the lids are again closed, and covered for a short time with a large pledget of wet wool. In extracting the cataract, I stand by the left side of the patient and raise the upper eyelid with the thumb or forefinger of my right hand. Then with the

left hand I depress the lower lip of the incision by means of a curette, a small Daviel's curette being to my mind most convenient. The incision being thus made to gape, gentle pressure is made on the upper part of the eyeball and cornea by the thumb or fingers through the upper lid. A slight rotatory movement on its horizontal axis is thus imposed upon the cataract, and its lower edge presents itself at the opening.

The cataract should be allowed as far as possible to escape slowly, its progress being followed downwards by a varying but gentle pressure of the upper lid. By judicious manipulation the *débris* of the cortex can be gathered as it were from under the iris, and so completely swept onwards, that very little management is needed for their complete extrusion.

If cortical matter still remain, the same manipulation of the upper lid, aided by supplementary movements of the lower lip of the wound by pressure with the fingers or thumb of the left hand through the lower lid, is all that is required for its gradual removal. There should be no "fishing" for cortical matter with the curette, except as a desperate measure.

The pupil being clear the iris should be entirely freed from entanglement in the wound and replaced either by gentle rubbing over the incision with the lids or, if obstinate, by the use of the curette. The iris being reduced the edges of the wound are very carefully cleaned and placed in apposition, and all *débris* of lens matter, clot, or other foreign substance removed from the conjunctival sac. A solution of the salicylate of eserine, of two grains to the ounce of distilled water, is then once or twice instilled, the lids are closed and covered with a layer of cotton wool between two layers of old linen, the whole well wetted in a solution of boracic acid, and a domet bandage is firmly applied over all.

I shall now offer a few remarks on the more important

features of the operation. These are undoubtedly the position and the character of the incision, and the performance of iridectomy.

Notwithstanding all that has been said against the employment of the lower section in cataract extraction, the fact that it presents the greatest facilities for the complete removal of the cataract remains incontestable. If an iridectomy were not imperatively needed in the linear operation there can be no doubt that the lower section would have been chosen.

The necessity for concealing the disfigurement produced by iridectomy is the main reason for the use of the upper section in that operation; the linear character of the wound renders unnecessary the support of the upper eyelid, which in the flap operation contributed in an important degree to speedy union.

If then an incision can be found which shall combine the main advantages of the linear incision and the convenience of the lower section, rendering at the same time iridectomy superfluous in the majority of cases, this may, I think, be considered a solid gain.

The incision which I employ, by its angular, quasi-linear character, and by the direction given to the knife in its concluding movement, forms a *trap-door* opening by which large space is obtained, the tendency to gape is reduced to a minimum, and the ready apposition of the edges is secured.

The tendency of the wound to gape being avoided, the manifest convenience and safety of the lower section should outweigh minor considerations. The natural tendency of the eye to roll upwards when irritated, the firmness with which, supplementing the natural act, the patient will keep it in that position when directed to do so, is of immense advantage. It renders all dragging of the eye about with forceps unnecessary. With the upper section much harm is done by pulling the eye downwards

in order to reach the wound. In unskilled hands not infrequently, and in skilled hands at times, prolapse of the vitreous humour results from this proceeding. Even if this grave accident do not happen the strain put upon the delicate intra-ocular structures must be great and injurious. All such risks are avoided when the lower section is employed. The lower section has another great value; it affords the utmost facility for examining the corneal wound after operation, with the smallest degree of displacement of the lids.

The consideration of the performance of iridectomy may be divided into two parts; its use as an ordinary means to facilitate the escape of the cataract; and its use as a preventive measure.

Ordinarily, it is necessary in small marginal corneal incisions to afford passage for the cataract. With the incision I employ it is necessary only when the cornea is unusually small, the nucleus of the cataract very large, or the sphincter of the pupil rigid and not freely dilateable by atropine. And when practised it should be confined to the removal of a piece of the inner margin of the pupil, (sphincter pupillæ), and so need produce but little disfigurement.

The performance of iridectomy as a preliminary or preventive measure requires somewhat fuller consideration.

In 1862, Mooren,* acting on Graefe's suggestion, performed iridectomy a fortnight before the extraction of the cataract. His results showed him to be right in his proceeding. It must, however, be remembered that Mooren practised the old flap operation, and that the tendency of the wound to gape gave ready opportunity for prolapse of the iris, which, in turn, increased the enormous percentage of losses, amounting to about 20 per cent. Experience has now shown

*Die Verminderter Gefahraen Einer Hornhautvereiterung—bei der Starr-Extraction. Berlin, 1862.

abundantly that it has not, with the linear method, the value it formerly had. I believe I am right in saying that serious trouble after cataract extraction but rarely begins in the iris. Iridectomy for artificial pupil or for glaucoma is almost never followed by inflammatory mischief, and it appears to me that the carefully-managed passage of a cataract between the cut edges of the radiating fibres of the iris cannot greatly enhance the risk of mischief. The really serious inflammations after cataract extraction begin behind the iris, probably in the ciliary region.

Personally, I would confine preliminary iridectomy to those cases in which the tension of the cataractous eye exceeds the normal degree.

It would not be right to conclude this description without a statement of the results attending the operation. I have now used this operation almost invariably during the last four years, but have unfortunately accurate notes of only 62 consecutive cases, in hospital and in private practice. For the notes of the hospital cases I am indebted to our excellent house surgeon, Dr. E. W. Wood-White. In the 62 cases, 38 or 61.3 per cent reached with astigmatism carefully corrected, $\frac{20}{20}$ or normal vision; 10, or 16 per cent, reached between $\frac{20}{50}$ and $\frac{20}{30}$; 5 or 8 per cent, reached between $\frac{20}{70}$ and $\frac{20}{50}$; 5 or 8 per cent obtained vision less than $\frac{20}{70}$; and 4 or 6.45 per cent. were lost, 2 from corneal suppuration, and 2 from other causes. These may be otherwise classed in the usual manner as 85.55 per cent. completely successful, and 8 per cent partially successful, making a total of successes at the rate of 93.55 per cent.

This is quite equal to the actual results of the linear method, especially when it is considered that the cases were in not any way selected, and the facility of performance of the operation I employ, as compared with the linear method, is immeasurably greater.

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