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ORIGINAL ARTICLES.

SOME OBSERVATIONS CONCERNING THE EXTRACTION OF CATARACT WITH- OUT AN IRIDECTOMY, AND THE USE OF THE BANDAGE IN THE AFTER-TREATMENT.

Read in the Section on Ophthalmology at the Thirty-ninth Annual Meeting of the American Medical Association, May 9, 1888.

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The question as to which is the best method of extracting senile cataract has lately been considerably discussed, and a return to the old flap operation, in all its essential features, has been advocated and carried into practice by several ophthalmic surgeons. Professor Schweigger has even abandoned the use of the narrow knife, and has substituted one very nearly of the same form as the one first used by Joseph Barth, the founder of the Vienna School of Ophthalmology, and adopted by Beer and commonly known as Beer's knife. In this respect Schweigger has returned to the practice of the great founder of modern ophthalmology, instituted over a hundred years ago. By this movement the cycle has been completed and we find ourselves at the point of departure. Movement does not always mean advance, however, and I believe that not only this return to the wide knife, but also the attempt to extract any cataract, hard or pasty, without an iridectomy, is a backward movement that a proper consideration of past experience should deter us from making.

To me the matter has been one of considerable interest, for, so far as I know, I was the first to devise the upward extraction without an iridectomy and using a narrow knife, as has lately been advocated by several operators. I published an account of this operation fourteen years ago, and claimed for it advantages that a more extensive experience proved to be unfounded. I soon abandoned it, I confess, not a little chagrined at having claimed such advantages for it, without a more prolonged trial and analysis of results.

When I first began to operate for cataract, about twenty years ago, von Graefe's extraction, devised but a few years before, had been almost universally

adopted both in Europe and this country. I knew of but one operator of note who still adhered to the flap extraction. I began to operate by making the flap extraction, but I soon abandoned the use of the wide knife, making the flap with a Graefe's knife and performing an iridectomy only when the iris offered unusual obstruction, or was injured in some way. I was induced to adopt this older method by a consideration of the danger that seemed to me inherent to the extreme peripheral incision advocated by von Graefe, and practiced by him and his followers everywhere at that time. This incision approached so near to the ciliary body that it seemed to me a dangerous position to inflict a wound; and, indeed, a few cases of cyclitis, ultimately involving the other eye, and seemingly due to the peripheral position of the incision, had already been reported. Besides this, the excision of the iris seemed like an unnecessary mutilation, and served to add to the traumatism from which the eye must suffer in the extraction. It seemed to me unwarrantable to incur these dangers, unless the operation could be shown to possess elements of safety that more than made up for these obvious disadvantages. Statistics had not then accumulated, as they have since, to substantiate the claims of Graefe's operation. But notwithstanding this, it was rapidly adopted through the magic influence of his justly celebrated name.

Probably the ease with which his incision is made, and the facility with which the lens can be extracted by his method, were not the least of the inducements that led to its rapid substitution for the more difficult flap extraction. It must be borne in mind that in the old flap extraction the incision was made with a wide triangular knife, known as Beer's knife. It required the greatest care and skill to complete this incision without allowing an escape of the aqueous fluid, and entanglement of the knife in the iris and various other complications that I need not mention now. Indeed, so much practice and skill was necessary to complete the incision in a suitable manner that surgeons generally hesitated to perform it, and quite generally operated for cataract by couching or displacement, long after that operation had been condemned by specialists as decided malpractice. One has only to read the statements found

at this period in any standard work on surgery, to see how formidable the operation seemed to them.¹ I remember now the many hours I spent in executing it upon the cadaver, and upon animals, before I attempted to make it upon a patient.

The flap when properly made, however, by reason of its large size, and lying in the cornea, just anterior to the sclero-corneal junction, allowed of a rotation of the lens upon its axis and passage through the pupil into the anterior chamber, from which it could generally be extracted without mutilating the iris. When a cure was effected, without accidental complication, there existed a central, movable pupil, and to the ordinary observer the eye seemed perfectly natural. Even on close inspection it revealed the absence of the lens only by the deep anterior chamber and tremulous condition of the iris. Indeed, its successful results were models of perfection. It was the ideal operation. Why was it abandoned? Besides the large number of cases lost by suppuration of the cornea, prolapse of the iris, and occlusion of the pupil, there were several reasons which were more or less important, that I shall not mention in detail here. The result from all these causes was that, even with the greatest operative skill that could be acquired, and the closest attention to after-treatment that could be bestowed, failure occurred so often that thoughtful operators sought for some method by which the dangers and failures might be lessened. The perfect results by this method were all that could be hoped for, and if "perfect results for the few" had been von Graefe's motto, he would never have proposed as a substitute the operation that bears his name. But, regarding "sufficient sight for the greatest number" as the prime object to be sought, he made the change, and soon reduced the number of failures to about one-third what they had formerly been, and complete successes he raised from 80 per cent. to 90 per cent.

Influenced by the considerations I mentioned at the beginning, I adhered to the flap operation until statistics, sufficiently extensive, should demonstrate the superiority of Graefe's extraction. Before this seemed to me established, Liebreich published his method of downward extraction, which he claimed to be as easy of execution as couching, as safe as Graefe's method, and as perfect in result as the flap extraction.

His operation was performed downward, the incision being made with a narrow Graefe's knife, the puncture and counter-puncture being about 1 millimetre external to the clear margin of the cornea, and a little below the horizontal meridian. From these points it was carried downward in a curved direction and terminated at a point about 2 millimetres above the lower margin of the cornea. Influenced by the claims thus made by so

distinguished an author, I tried it in several cases soon after his publication appeared. I was greatly disappointed, however, by finding, at the start, that the operation, contrary to his claim, was difficult in execution, for, by reason of the anterior position of the apex of the flap, I found it even more difficult to evacuate the lens without resorting to traction than in the flap operation, in which the incision was made more peripheral, and allowed of more ready escape of the lens under the influence of gentle pressure. Besides, Liebreich's method had the fault of downward extractions generally, and in case iridectomy became necessary the coloboma would be uncovered by the lid.²

From a consideration of this and other operations I devised an upward extraction somewhat similar to Liebreich's, but having the apex nearer to the sclero-corneal junction, only one millimeter or less inside of it, the puncture and counter-puncture being at about the same distance behind the margin of the clear portion of the cornea as in his operation. After making this operation a few times, I published a description of it in the Transactions of the Michigan State Medical Society for 1874, (page 237 *et. seq.*), and claimed for it superiority over other methods then practiced. From that report I quote the following: "The operation as I have performed it is made thus: the patient, having been chloroformed, a stop speculum is introduced and the eye fixed as in modified linear extractions. With a Graefe's knife the puncture is then made in the sclera, about a half a line from the margin of the cornea, and about a line, or a line and a quarter, below a tangent to the upper edge of the cornea; the counter-puncture is made in a corresponding position on the opposite side, and a flap is then carved out so that its upper edge shall be about half a line within the corneal margin. The capsule is then lacerated, and the other steps of the operation are the same as in flap extraction.

"The advantages of this method are:

"First, ease of execution:

"Second, as great safety from corneal suppuration as in the modified linear extraction.

"Third, as perfect results as by the flap extraction.

"Fourth, in case any accident requires an iridectomy, the coloboma will be covered by the upper lid, and thus the least inconvenience result."³

But I soon found it necessary to modify this operation very materially. I carried the apex of the incision farther backward, close, to the sclero-corneal junction, or even a little within, but still farther forward than Graefe originally recommended. I then made an iridectomy in all cases.

¹ See Gross' System of Surgery, fifth edition, vol. ii. p. 329; also W. Lawrence, Treatise on Diseases of the Eye, p. 430, edition of 1833.

² He suggested that it could be made upward, but it does not appear that he ever attempted it.

³ Transactions of Mich. State Med. Soc. 1874, p. 240.

I was driven to these changes by the accidents and difficulties inherent to any extraction in which the incision is not as peripheral as consistent with safety to the ciliary body, and these will require an iridectomy for the easy and safe evacuation of the lens, and greatest freedom from complications during the after-treatment. Unless the incision is, at the apex, well forward, and the flap large, there will be very great difficulty in rotating the lens forward so that it will pass through the pupil into the anterior chamber before it engages in the wound. If it does not do so, the iris is pressed before it as it engages in the opening, and, overlapping it, holds it as a hood and prevents its evacuation without dangerous pressure, and then only by stretching and bruising the iris in a manner that would greatly endanger inflammatory reaction. Any attempt to draw the iris backward over the edge of the lens, and replace it within the globe behind it, would hardly diminish the injury to the iris itself, and would be very liable to lead to rupture of the zonula of Zinn and escape of vitreous. Indeed, it has been said that Graefe was led to perform iridectomy, not merely to facilitate the escape of the lens, but because he had noticed that the most severe and destructive forms of iritis that occurred after extraction by the old method, had their starting point from this bruised and stretched portion of the iris. Infection would certainly be more likely to follow the replacement of the iris after such an exposure to conjunctival secretions, and this would be best avoided by excision.

An analysis of the next sixty cases operated upon by me, by this method, after publishing the description and making the claims above quoted, showed that iridectomy had to be performed in eight cases to avoid excessive bruising and stretching of the iris, or such prolonged and excessive pressure to evacuate the lens as greatly to endanger prolapse of vitreous humor. Even then prolapse of vitreous occurred seven times (equal to $11\frac{2}{3}$ per cent.).⁴ There were three cases of suppurative iritis resulting in reopening of the wound, suppuration of the cornea and loss of the eye, and one case of suppuration of the cornea beginning in the wound, and also resulting in loss of the eye. Prolapse of the iris occurred eight times complicating the recovery, though none led to immediate loss of the eye. There were fifty-one good results (85 per cent.), five partial successes ($8\frac{1}{3}$ per cent.), and four total failures ($6\frac{2}{3}$ per cent.) Cases in which the vision was $\frac{1}{16}$ or above, were counted as good results.

To be brief, I found the operation without iridectomy, tedious, and more likely to be at-

tended with prolapse of the vitreous than when iridectomy was made, and this I believe will be the experience of other operators. In twenty four cases of uncomplicated hard cataract, operated upon by this method and reported by Dr. Chas. S. Bull, prolapse of the vitreous occurred three times, and the lens had to be removed by a traction instrument.⁵ This indicates something wrong with the operation itself, for prolapse of the vitreous need occur but seldom in extraction with iridectomy. It does not occur, on an average, in more than 3 per cent. of my cases now. Again, lens matter was more often left in the eye, not only behind the iris, but scraped off by the protruding sharp upper lip of the wound, it became packed into Fontana's space, from which position it was very difficult, and sometimes impracticable to dislodge it. Iritis and occlusion of the pupil occurred with greater frequency than it has since in my practice, and the dense plug, formed by the remains of lens matter and iritic effusion, constituted some of the most difficult cases to relieve by secondary operation. Schweigger confesses that more than 50 per cent. of all his cases heal with posterior synechia. (*Archives of Ophthal.*, December, 1887, p. 453.) One frequent source of danger and annoyance, namely prolapse of the iris, seemed to me almost certainly avoidable by the performance of an iridectomy. This occurred in one of my cases five days, and, in another, four days after the operation, and to patients who had kept reasonably quiet.

In the cases already reported, I notice a repetition of my experience. In forty-eight cases collected in Boston, by Dr. Derby, in which this operation has recently been made by skilled operators, prolapse occurred in twelve cases, or one in four. In one of these it occurred without cause in a docile patient four days after operation.⁶ Schweigger in his report of his first ten cases operated upon by this method, cites one case of prolapse of the iris in the whole length of the wound. This equals 10 per cent. He expresses the hope that this per cent. may be lessened in future cases. (See *Archives of Ophthalmology*, December, 1887, p. 451 and 452.)

This danger I believe cannot be wholly, or even largely, guarded against by the use of myotics. A year ago I was performing an extraction under cocaine upon a female patient who seemed to have the usual fortitude until the operation had been begun and the incision made. She then became unmanageable, and so strained the ocular muscles that vitreous began to escape quite freely before I had begun the iridectomy. I immediately introduced a sharp hook, and with its back pushed the iris backward over the equator of the lens and burying its sharp point in the nucleus below the

⁴ This experience is not exceptional as may be inferred from the report of two operations by Schweigger, in both of which an iridectomy became necessary, and in one vitreous escaped, and in the other the soft lens matter had to be removed with the scoop. See *Archives of Ophthalmology*, December, 1887, pp. 452 and 453.

⁵ Transactions American Ophthal. Soc., 1887. Cases 1, 11, 13, of table following page 418.

⁶ Boston Medical and Surgical Journ., Feb. 23, 1888, p. 189.

centre, drew the lens, together with its capsule, from the eye. The iris did not then prolapse, but resumed its normal position, the pupil contracting as usual when the aqueous chamber has been emptied. Performing the toilet of the wound, I instilled a solution of sulphate of eserine (2 grains to the ounce), and applied the bandage. Eserine was instilled regularly and all seemed to be going on well when, on the fourth day, without undue exertion on the part of the patient, a sudden pain occurred in the eye, and on examination the wound was found to have reopened and the iris was prolapsing. This case recovered only after a prolonged convalescence, and several operations, and then with a pupil drawn upward toward the wound. The effect of mydriatics, I believe, is too transient to maintain contraction of the pupil without too frequent instillations, and injurious meddling with a eye after operation for cataract. Besides, it is not rational to expect them to contract the pupil powerfully enough to resist the outward gush of aqueous humor which tends to carry the iris through the wound when it is suddenly broken open by the intraocular pressure.

I need not dwell upon the gravity of this annoying and dangerous accident. It is in most cases only remedied by resorting to a severe operation before the eye has recovered from the traumatism of the extraction, and recovery is generally tardy and often incomplete. Prolonged irritation may ensue, and cyclitis follow, with ultimate destruction not only of the eye operated upon, but the other through sympathy. My experience with this troublesome complication led me to bring the apex of my incision just at the sclero-corneal junction, and thus avoid so large a flap, and also to make an iridectomy in all cases, as a preliminary step to evacuation of the lens. At first I sought to remove as little of the iris as possible, thinking this would allow of easy evacuation of the lens during operation and also of an unobstructed escape of aqueous in case of a sudden reopening of the wound, and thus avoid the extensive prolapse of the iris that would result when it is left entire. In such a case the iris forms a sac, holding the aqueous and acting as a dilator to separate the lips of the wound, often to the utmost extent. I found, however, that when the iridectomy was small the iris still offered some obstruction to the escape of the lens, necessitating a larger flap than would otherwise be needed, and also that an occasional prolapse of the iris at the angles of the wound would occur during the after-treatment. Though these were not so dangerous as the extensive prolapses that often occurred when no iridectomy was made, they still constituted a not very infrequent and quite troublesome complication. These accidents led me to enlarge my iridectomy and I now always aim to remove a large section of the iris. While but a small portion of the pupillary border is cut away,

I seek to remove a large portion of the periphery, in fact, nearly all of that portion that lies behind the incision. The iridectomy thus made is as large as we would attempt for the relief of glaucoma.

I am aware that many operators severely criticise such an iridectomy, and I think of but one distinguished ophthalmologist who professes to practice it.⁷

I have found this large iridectomy not only a safeguard against prolapse, but also against those glaucomatous attacks so painful and dangerous at times during a late attack of iritis following extraction without an iridectomy, or when only a small iridectomy has been made. A large iridectomy also allows of a safer extraction, and a more complete evacuation of soft lens matter, and that, too, with a smaller flap than would otherwise be required. The danger of suppuration of the cornea is thus greatly lessened. The coloboma, in an upward extraction, is so largely covered by the upper lid as to give rise to very little visual disturbance.

In the after-treatment of cataract extractions I deem the application of a bandage covering both eyes, a very important measure. Properly applied, it helps to ensure the healing of the wound, and lessens the dangers of internal inflammations also.

The bandage should be applied in such a way as to exercise gentle pressure upon the orbital portion of the orbicularis muscle. By means of absorbing cotton, properly packed into the depressions about the globe, it serves also to exercise some pressure about it in such a way as to maintain the convexity of the cornea, and more complete coaptation of the flap. This, by some, may be thought a fanciful measure, but it is rational practice, in my opinion. Slight pressure, not uncomfortable in degree, often serves to prevent that troublesome attempt to wink that is annoying to some patients, and which may prove injurious just after an operation. The unoperated eye should be closed and covered with a compress and bandage, as well as the eye operated upon. This, I believe, is of great importance, for, if the unoperated eye is left open, the necessity to wink will exist, and every time the lids of this eye close, there will be a similar, sudden, spasmodic contraction of the orbicularis of the operated eye. This will compress the globe, and must cause a slight motion of the lips of the incision, unfavorable to speedy union. In the case of a fractured bone, such a motion would be regarded as very dangerous to the proper healing process, and bony union might be wholly prevented. It can have only an evil influence upon the healing of the wound after a cataract extraction.

⁷ E. Landolt. See discussion at Ninth International Med. Congress in the American Journal of Ophthalmology, Sept. 1887, p. 261.

If any one will place two or three fingers lightly upon the closed lids of one eye, while the other is left open and winking, they can readily demonstrate the strong contractions of the lid of the closed eye, which take place every time the winking occurs in the eye that is left open. These contractions are strong, and must give rise to a sudden and decided compression of the globe, that cannot occur without producing some motion of the lips of the wound.

Again, if the unoperated eye be open and used, every motion of the ball will be attended with a corresponding motion of the operated eye. This will be likely to cause gaping of the wound and occasional evacuation of aqueous, and perhaps prolapse of the iris also. Even the exposure of the unaffected eye to light acts as an irritant to the other. This is a matter of physiology well known. It would tend to produce inflammatory reaction when it might not otherwise result. If inflammation has already commenced, it would serve to intensify it. In every case of injury, followed by inflammatory reaction, we find the patient complaining that use of his uninjured eye aggravates the pain, if present, in the one injured. Often such an exposure of the well eye is the only exciting cause of pain in the injured one, there being no pain in it when the other eye is not used or exposed to light. These examples are sufficiently numerous to enable us to establish the principle that *when one eye has been subject to severe traumatism, the other should be shielded from light, and use of it, as much as possible, avoided.* More than this, the bandage and thick cushion of cotton serve to protect the eye from accidental blows that may otherwise do harm, and is much easier to remove than plasters generally are.

The patient should be confined in bed. It is here that he can be kept most quiet and his circulation in the best condition to avoid inflammatory affections of the interior of the globe, that are so frequently a cause of failure after an extraction. If an iritis exists we would certainly require confinement to bed. If we could control our patients suffering from any form of iritis, we would confine them all to bed. Our failure to cure the disease, and the prolonged course which many cases pursue, may be justly attributed to the fact that the patient goes about, and is thus exposed to influences that tend to cause relapses and aggravate the disease in all its stages. Why should we court this danger, always liable after cataract extraction, by allowing a patient to be dressed and to go about almost at pleasure, as some propose to do? It has frequently occurred in my practice, that everything has gone on well until the beginning of the second week, when some slight exposure on the part of the patient who is allowed to be up and dressed, has provoked an obstinate iritis. If I could have my way I would keep all imprudent patients in bed, and

under the care of a discreet nurse, for full two weeks after an extraction.

As a result of experience in making over seven hundred extractions, over two hundred of them being flap operations, I have come to the following conclusions:

First. That a narrow, sharp pointed Graefe's knife is the most convenient instrument with which to make the incision for the extraction of hard, half hard, or pasty cataracts, whether an iridectomy is to be made or not. It is the only knife with which a suitable flap can be made, one with edges in such a form as to remain in proper coaptation under the pressure of the lids.

Second. The incision should not be farther forward than the sclero-corneal junction at the apex, and at the lower angles should be about one and a half millimetres behind it.

Third. A large iridectomy should be made, so as to remove obstruction to the escape of the lens, and avoid the danger of prolapse in the course of recovery.

Fourth. The flap should be as small as possible and yet allow of an evacuation of the lens without undue pressure.

Fifth. Extraction without iridectomy requires a larger flap than would otherwise be necessary, and thus adds to the risk of suppuration of the cornea. It does not allow of so complete evacuation of lens matter. The retained lens matter, together with bruising and stretching of the iris; adds to the danger from iritis following the operation.

Sixth. The dangers of extraction may be greatly lessened by performing a preliminary iridectomy two or three months previous to the removal of the lens.

SECTION OR EXSECTION OF THE RECTUS

IN THE TREATMENT OF PARALYTIC STRABISMUS, AND THAT DUE TO EXTREME OVER-CORRECTION WITH LOSS OF MOTION.

Read in the Section on Ophthalmology at the Thirty-ninth Annual Meeting of the American Medical Association, at Cincinnati, May 7, 1888.

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The purpose of this paper is the presentation of a series of cases of *irretrievable* loss of power of either rectus, causing extreme paralytic deviation, the restoration of the equilibrium having been accomplished through *section* or *exsection* of the contracted muscle. Such cases are found in one of the four following classes:

1. Permanent atrophy or paralysis.
2. Irrecoverable loss of either rectus through accidental section of the muscle back of its capsular perforation.