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NOTES ON
EXTRACTION OF SENILE CATARACT.

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NOTES ON EXTRACTION OF SENILE CATARACT.¹

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SOME years ago I had the honour of addressing this Society on the well-worn theme of the operation of extraction of senile cataract. The object of that first communication was to protest against the operation as it was at that time almost universally done in Glasgow, namely, with a downward section and a preliminary iridectomy. Since that paper was read, I do not say in consequence of it, the downward section is, so far as I am aware, a thing of the past in Glasgow. It is difficult to assign a sufficient reason why so bad an operation should have been practised for so long a time. Year by year the number of cases of downward section reported in the annual statements of the Glasgow Eye Infirmary has been growing less and less; thus it may be hoped that this operation is now reserved for a few rare and exceptional cases for which it may be preferable.

As regards preliminary iridectomy, I have seen no reason to alter the objections to this procedure which I then advanced. These were briefly as follows:—

1. If a preliminary iridectomy is performed, the eye is twice exposed to the risks of septic infection; when the combined operation is performed, it is only once thus exposed.

2. The corneal astigmatism resulting from a cataract extraction must bear some relationship to the amount of cicatrisation. Now, two incisions in the cornea must give rise to a larger amount than one.

3. If one operation is sufficient, why annoy the patient by two? It serves no good purpose, and, as a matter of fact, is very seldom resorted to, except in Glasgow. I have never once seen it in any of the Continental clinics which I have visited, although I am given to understand that it is still done by a few operators.

In the main, it may be asserted that the operation of

¹ Read at a meeting of the Glasgow Southern Medical Society held on 8th February, 1900.

preliminary iridectomy arose out of a mistaken idea. It was supposed to be of value in preventing iritis or suppuration after cataract operations. It was gravely contended that the pressure of the lens on the iris, in its passage out of the eye, was the cause of iritis, and hence a way was cut through the iris to facilitate the removal of the lens. Afterwards, the iridectomy came to be done about six weeks or so before the extraction. No one now, before operating on a patient, submits him to a prolonged course of purging, or ever, as a preliminary step, performs venesection, as was formerly the case, for the prevention of inflammation, and in the majority of cases the preliminary iridectomy may be compared with such proceedings.

At the same time, for reasons which will be discussed at a later stage, it seems to me to be advisable to make an iridectomy at the time of the extraction.

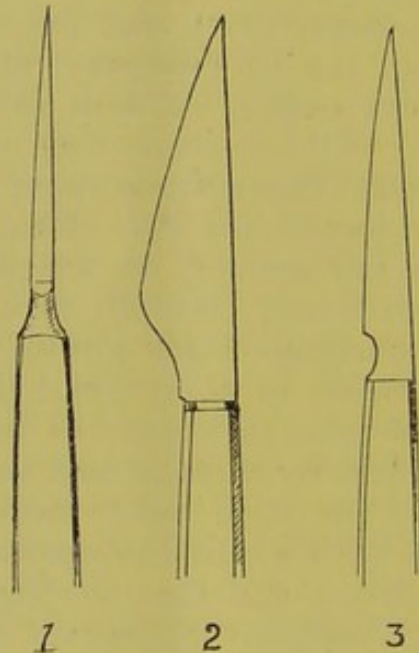
The incision which I like is one made entirely in the apparent sclera, and in making it I take care to cut a large conjunctival flap. As soon as the section is complete, the flap is carefully folded down over the cornea, in order to be out of the way, till the iris is excised and the lens extracted. Whenever this is done, the lips of the wound are washed clear of all blood-clot and lens *débris*, and the conjunctival flap is replaced. The advantage of the flap is that a conjunctival wound heals at once, within a few hours of its being made. As soon as conjunctival union is complete, the deeper structures are tolerably secure from septic infection, and the slower process of union in the sclero-corneal wound is thus rendered free from risk.

The iridectomy is also performed to facilitate rapid union. Many of the best operators have of recent years gone back to the old operation without an iridectomy at all, and in a few cases I tried that method. I found, however, that when this was done, in a very large proportion of cases there was subsequently prolapse of the iris between the edges of the wound. Nor was that experience peculiar to myself, for I found a large percentage of cases of prolapse of the iris in operations performed by operators of world-wide reputation who had adopted this method, and who candidly gave us their results. Now, for union in the cornea or sclerotic to be rapid, corneal tissue must be next to corneal tissue, and sclera to sclera. If a piece of foreign tissue, such as iris, gets between the two approximating pieces of sclera or of cornea, then union must at best be slow, or altogether faulty. For similar reasons, in days gone by, osseous union of a fractured patella

was extremely rare, on account of the enclosure of a layer of fibrous tissue between the fragments. It seems, therefore, better to run no risk, but to excise a portion of the iris when operating. If this be done, prolapse does not take place.

The earliest operations of which we have authentic records were done by couching. In that operation, as is well known, the lens was simply pushed back with a needle into the vitreous humour, where it lay, allowing the pupil to be free. When this method succeeded the results were highly satisfactory, for it left a round, circular pupil. Unfortunately, however, in a large number of cases there was secondary inflammation, and ultimate loss of the eye. What was the cause of this unfortunate result is now, since the operation has been entirely abandoned, a somewhat difficult matter to determine. The explanation generally given was that the lens in its new position lay against the ciliary body, and that each little movement of the eye caused the lens to strike against this important structure. Hence there was supposed to arise a certain irritation of the ciliary body, with ultimate inflammation and consequent loss of the eye. That is an explanation which, in the main, can scarcely be accepted, for in the first place this inflammation only occurred in a certain number of cases—in a large percentage there was no such result. Moreover, it is the experience of every ophthalmic surgeon to see, from time to time, persons in whom the lens has been shoved into this very position by trauma, and in whom there is no subsequent cyclitis. A much more probable explanation is that the instrument with which the operation was performed was in a septic condition, and that the consequent inflammation was due to its being so. However this may be, Daviel thought that better results might be obtained by removing the lens altogether, and in 1745 he performed extraction. He, then, was the founder of the modern operation. Yet his efforts left much to be desired. A number of extractions were followed by acute inflammation, involving the entire loss of the eye. Hence various operators, from his time to the present day, have endeavoured to modify the methods of extraction so as to obtain a better percentage of successful cases. One of the earliest to change Daviel's proceeding was Beer. He attributed the failure of the original operation to the nature of the section, and thought that the employment of a different knife would ensure better results. The opinion which he formed was that, if he had a knife which would make the incision at a single stab, that then the edges of the wound would be smoother, and that primary union would be more

readily obtained. In the accompanying diagram we have Beer's knife (Fig. 2). It will be observed that it is very broad, so that when once the puncture was made a single thrust of the knife forwards would complete the section. His incision was made in the apparent corneo-scleral margin, and involved half of the circumference of the cornea. His results were better than those of Daviel, yet in many cases suppuration of the cornea took place. The explanation of these disasters was thought to be that Beer's incision involved so much as one half of the cornea. It seemed a fair deduction, in the then state of pathological knowledge, to assume that as the cornea is known to receive its nutriment from the conjunctiva and from the sclera at the limbus corneæ, that an incision of this



kind and of this extent, by depriving one half of the cornea of its direct supply, must lower its vitality and induce suppuration or necrosis. It occurred to the great von Graefe that if the section of the cornea could be made less extensive than in Beer's operation, that then sloughing of the cornea would be more rarely seen. This, he thought, could best be done by using for senile cataracts an incision as nearly as possible similar to the one which had proved to be so useful for soft cataracts, namely, a linear section. Beer's knife was obviously not suited for the making of such a section, hence von Graefe introduced the linear section knife (Fig. 1), which still goes by his name, and which is the one still used by the very large majority of operators. It is an excellent knife, and although our incisions are no longer linear, but

involve a large conjunctival flap, still it is well adapted for any method of section.

A competent operator will not, within wide limits, lay special stress on the kind of knife which he uses; at anyrate that is a matter of secondary importance. Graefe's knife is one which I like, because it is so easy to cut a conjunctival flap with it, a thing which I regard as a most desirable step in the operation. Within recent years attempts have been made to introduce a knife which, in its main characteristics, is not unlike that used by Beer, only it is not nearly so broad. The first of these that I remember to have seen was in Sichel's clinic, in 1881. It was very nearly identical with the one shown in Fig. 3 (Mr. Teale's knife, exhibited at the last meeting of the British Medical Association in Glasgow). So far as I remember, Sichel still used his knife to make the section with a single thrust forwards. More recently I have seen various operators use similar semi-broad knives with an ordinary backward and forward movement, such as is used with the narrow linear section knife. When one of these instruments is thus employed, I do not see that it possesses any advantage over Graefe's, or any other form of narrow-bladed knife.

Although the exact form of the knife is not a matter on which any competent operator will lay much stress, yet no conscientious surgeon will use any instrument unless he is certain that it has been properly prepared. In the communication which I made to this Society some years ago, I advocated the sterilization of all the cutlery by the process of boiling. That was a method which I had seen employed in Dublin about 1887, and on my return I at once put it into practice, to the immense amusement of my colleagues, who made many good-natured but jocular remarks as to my "culinary efforts." It was found inconvenient at the Glasgow Eye Infirmary to prepare for me the instruments in the manner in which I required them; so, after a few ineffectual attempts, I gave up the effort, and determined to use only my own cutlery and to prepare it myself, a practice which I still observe. Times, however, have changed; Dr. Barker, who was recently house surgeon with us, introduced an apparatus into the infirmary, and now all instruments are regularly boiled. In addition, just before operating, I dip all instruments in ether and alcohol; thereafter they are transferred for a few minutes to a 1 to 20 solution of carbolic acid; and, finally, they are placed in water which has been boiled and allowed to cool. It is quite true that such a process works

havoc with the edge of a knife, and that at the most it cannot be used, without being reset, for more than four or five operations; but, then, a new setting can be obtained at a cost of one shilling, whereas a new eye cannot be had at any price. A question of that kind is not one which should be entertained at all.

With equal care should the dressings, eye-drops, and lotions be prepared. Accuracy in these matters is quite as important as manual operative dexterity, perhaps, even more so; for, while a clumsy operator may quite well get a long series of excellent results, a dirty one, although dexterous in his proceedings, will not. For preparation of the dressings, any good sterilizer will do. The one which I have now used for a number of years is that of Dr. Bronner, of Bradford. It is a steam apparatus, and by its means all the cotton-wool and bandages which are to be used are exposed to steam for two hours. They are then placed in earthenware jars, on which lids are tightly screwed down. These jars have previously been kept for some considerable time filled to the brim with a 1 to 20 solution of carbolic acid. Care, also, must be taken to have the lotions which are to be used perfectly sterilized. That is a point of far greater importance than the exact composition of the washes which are to be used. It seems, however, tolerably certain that, in ophthalmic surgery at anyrate, little good is to be obtained from the application of those remedies which are called germicides. In general surgery, no doubt they may be of use, for there they can be applied in strengths which are germicidal. Strong solutions, either of sublimate or of carbolic acid, are well tolerated by the skin. The strongest solution of bichloride of mercury which the human conjunctiva will tolerate is 1 in 8000. Now, it has been shown that a solution of the same drug, of the strength of 1 in 1000 takes twenty-five minutes to kill the staphylococcus aureus. How, then, can a short irrigation with a solution of the remedy immediately before the operation be supposed to affect the result in the least? And if this be true of bichloride of mercury, it is in a much higher degree true of such inert substances as boracic acid and boro-glyceride. Gentlemen who are in the habit of prescribing lotions with such remedies in them, have surely never made any experiments whatsoever to ascertain their properties or they would have found out early in their work that they are of no use. It is mere prescribing without knowledge.

If none of the remedies are, in the strengths in which it is safe to apply them to the human conjunctiva, to be depended

on, what then can be done? From one or two experiments which have been made by myself and by numerous other experimenters, and from two cases which I have seen and about which I shall give details when I come to speak of the preparation of the patient, it would appear that the best method of rendering the conjunctiva aseptic is by the simple process of rubbing it thoroughly several times each day with sterilized cotton-wool moistened with some sterilized fluid which will cause no irritation, such as boracic acid solution, boiled water, &c. That treatment, combined with frequent irrigations, will, as has been abundantly proved, mechanically remove all pyogenic micro-organisms, and render the operation safe. Mechanical removal is quite possible, and probably it is at present the only method which is applicable.

As regards the preparation of drops, such as of atropine, pilocarpine, cocaine, &c., the same rigid precautions have to be taken. For my work they are prepared under under my own supervision, within an hour or so of their being required at the operating-table. The salts of these alkaloids are kept in little packets, each containing half a grain. The flasks in which the solutions are to be made, and the droppers which are to be used, are thoroughly sterilized with 1 to 20 carbolic acid. They are then washed quite clean with boiled water; the contents of one or more of the little packets is put into the flask, and is dissolved by the addition of hot water. No drops should, under any circumstances, be used which have stood for more than a few hours. It will be objected that cocaine treated with hot water loses its properties as an anæsthetic. All I can say is that such has not been my own experience. It has answered to the entire satisfaction of myself and assistants. Moreover, I have not seen the striped keratitis which is said sometimes to follow the use of this drug, nor any of its toxic effects.

Such extreme precautions may still seem to some to be needlessly stringent, but no pains ought to be spared to ensure success. Almost all inflammation, if not all following operation, is due to septic causes, and therefore preventable. It is the duty of the surgeon to see to it that, so far as he is concerned, no stone remains unturned. For a considerable number of years, everything to be used at the operating-table, both for my private practice and for my hospital work, is prepared under my own immediate supervision in my own premises. I regard these preparations as a most important part of the operation, and certainly they should be seen to by the surgeon himself.

The first efforts which I made at a proper preparation of the patient consisted in keeping the eye constantly bandaged with compresses moistened with bichloride of mercury. Almost from my first appointment to the Eye Infirmary, I made it a rule, if possible, never to touch any eye that had not been subjected to this line of treatment for at least forty-eight hours. That practice is still continued, although I doubt its utility. Within recent years I have had a large number of cultivations made from the human conjunctiva, and when it can be arranged no operation is undertaken till a cultivation has been made and the absence of pyogenic organisms ascertained. The case which determined me on this course of action was one in my hospital practice in which there was suppuration.

The patient was a woman, J. R., aged 60, who was admitted to the Glasgow Eye Infirmary on 24th July, 1897, with mature cataract in one eye and incipient in the other. As there was slight hyperæmia of the eyelids, the operation was delayed for a week, during which time the conjunctiva was treated with nitrate of silver solution. A few days after it was reported to me that there was now no evidence of conjunctival mischief, and I accordingly operated. The operation was a superior incision with an iridectomy. All went well for the first four days or so, but on the fourth the patient complained of severe pain, and on examination a considerable amount of discharge was found on the dressing. It was the beginning of suppuration which ended in the destruction of the entire eye. During the inflammation, a cultivation was taken from the conjunctiva of the other eye, and it was found to produce streptococci. Therein I learned a lesson, namely, never to operate on any eye without first taking a cultivation. This should certainly be done wherever possible. As an illustration of the importance of this precaution, I recently saw an interesting case. An elderly woman had been operated on for cataract by a friend, with the result that the eye was lost by suppuration. I was asked to do the other eye. Before operating, cultivations were taken, and in the conjunctival fluid of the eye on which I was to operate an abundant indication of staphylococcus aureus was found. That seemed thoroughly to explain the loss of the first eye. Several weeks elapsed before I was sure that the micro-organisms had ceased to be present. Ultimately, operation was successful in restoring sight to this eye. In her case the method adopted of getting the conjunctiva into a fit condition was simply abundant irrigation and rubbing

with cotton-wool moistened with a sterilized solution. In the first stages of the preparation of this case, I made an attempt to get matters put right by the use of nitrate of silver, applied in the strength of 3 grains to the ounce of water. It was a complete failure, for, at the end of some days, the micro-organisms were more numerous than ever, and the conjunctiva became much inflamed. The nitrate of silver was apparently entirely without any germicidal effect on the organisms.

I had a similar experience in 1897 with a patient from Millport, who came to be operated on for cataract. There was chronic catarrhal ophthalmia in both of his eyes. In each the conjunctiva of the inferior retrotarsal fold was chronically inflamed, although that of the eyeball itself was apparently quite normal. *Staphylococcus albus* was, on cultivation, found to be abundantly present, and, consequently, operation was deferred. For some weeks the eye selected for operation was kept covered with pledgets of sterilized cotton dipped in bichloride of mercury solution, and held in position by the turn of a bandage. At the end of ten days the growth was as abundant as ever, and for the next few days I employed nitrate of silver in the usual manner. All to no purpose; the conjunctiva only became the more red, and successive cultivations showed the albus to be as abundantly present as ever. What these remedies failed to do simple but efficient irrigation did in a comparatively short time. Since these experiments, I have doubted the propriety of using strong solutions of nitrate of silver or of protargol in the treatment of purulent conjunctivitis of specific origin. Is there any proof whatever that our doing so in any way kills the gonococcus? ¹

In view of such cases, and in consideration of our present knowledge of the pathology of the whole subject, it is most

¹ Since writing the above, my attention has been called to an interesting article by Mr. Sydney Stephenson, who may be regarded as one of the best authorities on conjunctival diseases. It is significant that he finds quite as good results from the use of a weak solution of protargol in the treatment of purulent conjunctivitis as from the use of the stronger nitrate of silver solutions. That is an experience which coincides with my own. I still use protargol; but probably the best line of treatment is the frequent mechanical removal of all infective material. Were the germicidal action of any drug thorough, then it should be in the power of every surgeon at once to cut short an attack of gonorrhœal ophthalmia or of ophthalmia neonatorum.

desirable that no important operation should be undertaken without a bacteriological investigation. Quite recently I made a strong representation to the then chairman of the house committee of the hospital to the effect that this should be done by the pathological department of the hospital. That gentleman, however, replied that unfortunately inquiries of this kind could not be undertaken by the institution. It seems to me to be of as great importance as the endless cutting of sections and mounting of specimens precisely similar to hundreds which have been seen before.

Coming now to the question as to whether all the labour involved in these extensive preparations is really, and, from a practical point of view, well spent, we can only appeal to facts. My friend and assistant, Dr. Cochran, has recently looked over my cases in the books of the Eye Infirmary, and has taken the last one hundred and ten operations by extraction for cataract. I deem it well to confine myself to these cases, for I have only once in my lifetime, in private practice, had suppuration of the cornea. In that patient it undoubtedly arose from a septic condition of the lachrymal passages. The lady in question came from Bridge of Allan, and, as she was anxious to get back as soon as possible, I consented to operate on the following day. When I saw her, after testing the field of projection, I made strong pressure over the lachrymal sac. There was no feeling of fulness, and no regurgitation of tears or of pus. All seemed quite satisfactory, and, accordingly, I operated on the following day. About twenty-four hours after the operation intense inflammation set in, and the eye was lost from suppuration of the cornea. On inquiring into the matter so soon as these untoward symptoms appeared, I found that the patient had suffered for many years from obstruction of the nasal duct on the side of the eye operated on, and that, by pressure, she had emptied the sac shortly before being seen by me. With the exception of this one case, I have never had, in my private practice, suppuration of the cornea following extraction of senile cataract. Had that patient been kept under observation for some days, and had cultivations been made, I think that this untoward event would have been avoided.

Of the one hundred and ten cases specified, in three only has there been acute inflammation following the operation of extraction. Full details of one of these cases have already been given in this paper—the case of J. R. In neither of the other two was the eye completely lost; there was a possibility of ultimately restoring sight by subsequent operation,

although it does not appear, from the hospital records, that such was ever undertaken. Moreover, in one of these we had distinct proof that the patient had himself tampered with the bandages after the operation.

On looking over the manuscript matter supplied to me by Dr. Cochran, I cannot find that I have had on any occasion to perform iridotomy. Hence I think that it may fairly be concluded that there has been very little plastic iritis. That there is after almost every extraction some iritic irritation, is almost certain. Moreover, adhesions between the iris and the cicatrising capsule are by no means infrequent, and probably cannot be prevented; yet acute plastic iritis is, in my opinion, always the result of sepsis. I cannot conceive of any other cause. Now, this series of cases has, I think, given good results. It is true that Knapp and various others have been able to give as long a series as this without recording any mishap at all, but I think that the results given here will bear a comparison with those generally obtained by most operators. It is, at anyrate, a vast improvement on the results obtained before all these precautions began to be taken.









