On the operation for the removal of cataract : as performed with a fine sewing needle through the cornea / by Arthur Jacob.

ON THE OPERATION

FOR

THE REMOVAL OF CATARACT,

AS PERFORMED

WITH A FINE SEWING NEEDLE

THROUGH

THE CORNEA.

BY

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CATARACT.

OPERATION THROUGH THE CORNEA

WITH THE

NEEDLE EMPLOYED BY DR. JACOB.

The following paper was published several years ago in the Dublin Hospital Reports. I now republish it because these valuable volumes have become scarce, and are consequently out of reach of the majority of practitioners, and because I have, within the last year, had frequent applications for information on this subject. I am also induced to direct the attention of surgeons again to this method of removing an opaque lens, in consequence of the want of confidence reposed in it by many from an imperfect acquaintance with its practice. My experience as to the use of this needle, and the selection of the cornea as the place for its introduction since the publication of this paper, leads me to express still more strongly than I have done my conviction of the superiority of this operation. I think I can with safety state that I have performed it more frequently, and practised it for a greater length of time, than any man now living, and therefore do I think that I have a right to speak of its merits without hesitation or fear of contradiction. Many will probably think that I form a false estimate of the value of my experience in this matter, or perhaps that I am not aware of the amount of experience which others have acquired respecting it; but when I find,

what I consider, the best method of repairing one of the greatest losses which man sustains from disease or accident, undervalued, I am compelled to advocate its adoption, regardless of anything that may be said respecting my motives for so doing, or the means I employ to accomplish my object:

"Without taking part in the protracted discussion respecting the comparative merits of the different operations for cataract, I shall recapitulate the arguments which have been urged in favour of that operation, to which I consider the needle, which I have to describe, as particularly applicable. The operation to which I allude is that of opening the texture of the lens, to produce its absorption by exposing it to the action of the aqueous humour.*

* Surgery is indebted to Mr. Pott for the important fact, that cataract may be removed by absorption, if exposed to the contact of the aqueous humour by opening the capsule; and doubly indebted to Mr. Saunders for establishing by repeated operations the value of the suggestion. Attempts have lately been made to transfer the credit of this improvement to others. Mr. Guthrie first gives the merit to an old lady, contemporary with Theodore Mayerne, and then, with more reason, to Paul Barbette; but as the works of these authors have not been republished since 1690, and as the copies extant are not of frequent occurrence, it must be allowed that it is probable they were not plundered by Mr. Pott and Mr. Saunders. Frick, an American writer, attributes the improvement to Gleize, who himself actually gives Mr. Pott the credit of the discovery.

Among other technical terms in ophthalmic surgery introduced from Germany, we have that of *Keratonyxis* applied to this operation generally, although it can have reference to the anterior operation only; and with the word, we have the claim of Dr. Buckhorn to the anterior operation, which English surgeons have been practising for nearly twenty years at the suggestion of Mr. Saunders, and this on the grounds that Dr. Buckhorn published an Inaugural Dissertation on the subject in 1806.

The strongest argument in favour of this operation is, that it is the most easily performed, affording a valuable resource to the surgeon, who, unpractised in extraction, wishes to avoid the evil consequences of depression. Another argument scarcely inferior in weight to the last is, that the injury inflicted on the organ is much slighter than in extraction, where so extensive a wound of the cornea is made, or in depression, where the vitreous humour is necessarily lacerated, and the retina frequently injured. If the objections to depression be well founded, recourse must be had to this operation in those cases where extraction is ineligible or impracticable. If after the operation has been commenced the lens is found too firm to yield to the needle, extraction may immediately be performed. It is, if not the only operation applicable to capsular cataract in general and congenital in particular, at least the preferable one: where the eye cannot be fixed without subjecting it to considerable pressure, it is obviously to be preferred. It is urged as an objection to this operation, that it is applicable to cases of soft cataract only. Whatever meaning may be attached to the term soft cataract, my experience leads me to the conclusion, that the operation, properly modified, is applicable to the great majority of cases, perhaps to nine in ten. It is said that it often requires to be repeated; but this is a minor evil to which we submit, in preference to incurring the risk of either of the other operations. Extraction, if unsuccessful, cannot be repeated, and a repetition of depression is not very desirable. It has been said, without the least foundation in truth, that vision is not as perfect after this as after other operations; the reverse is, I believe, generally speaking, the fact. That more time elapses between the performance of the operation and the recovery of sight than in the other operations must be admitted; but this, which may be a very

valid objection on the part of metropolitan oculists, many of whose patients come from a distance, cannot be considered of great importance elsewhere, the disadvantage of delay being counterbalanced by the greater security afforded by the mildness of the operation. From the circumstances above stated, it appears that this operation must be, and is, very generally resorted to by surgeons, and therefore any attempt to improve it should be treated with indulgence.

It has been a subject of some controversy, whether this operation should be performed by introducing the needle anterior to the iris, through the cornea, or posterior to it, through the sclerotic; and hence the terms anterior and posterior operations. The strongest argument in favour of the anterior operation is, that the injury inflicted is much less, the needle being passed through the cornea only; while in the other case it is passed through the sclerotic and choroid, wounding the ciliary processes, and probably often pricking one of the ciliary nerves. The sclerotic being a fibrous membrane, there is every reason to apprehend the consequences which generally result from injury of structure of that description; added to which we have the consequences of the injury sustained by the choroid. On the other hand, there are few varieties of structure which bear injury so well as the cornea: it heals rapidly when scratched or wounded: the extensive incision made by the extracting knife heals in a short time, although exposed to the friction of the eyelids, and bathed in tears: the wound of a cataract needle is closed in a few hours: if a staphyloma, or a dropsical eye be opened, a portion of the cornea must be removed, or a foreign body introduced, to prevent the orifice from closing. Wound of the iris may occur in either operation. That the lens can be more effectually lacerated, and its texture opened,

by introducing the needle, of which I shall presently speak, through the cornea, I am quite satisfied.

Some high authorities, among whom is Mr. Travers, are inclined to think that the objections urged against the posterior operation, on the ground of the injury sustained by the sclerotic and choroid, exist in theory only. I am, however, inclined to believe that those evils which we are justified in apprehending from the nature of the parts injured, actually do occur, and that the posterior operation is more frequently followed by destructive inflammation than the anterior. There can be no doubt that surgeons become biassed in favour of the operation which circumstances have led them to adopt, but the opinion of Mr. Saunders, who practised both operations, should have great weight. He says (p. 149): 'The surgeon has more power in the posterior than the anterior operation; but *the latter excites less pain and inflammation*, and inflicts a slighter, if any, injury on the vitreous humour.'

The surgeon who would succeed in restoring vision, by exposing the lens to the contact of the aqueous humour, should never forget that the most formidable impediment to his success is the inflammation which follows the operation; and that his aim should therefore be to accomplish his object with the least possible injury to the organ. He must also recollect that the lens displaced, whether whole or in fragments, is equivalent to a foreign body in the eye, and must therefore be so disposed that it shall not press on the iris. A notion very generally prevails, which I cannot but call a very mistaken one, that it is necessary to place the fragments of the lens in the anterior chamber to accomplish their solution and absorption. The inexperienced operator may rest assured that if he adopts such practice indiscriminately he will have reason to repent of it. Sir W. Adams, describing such a proceeding, says, after no-

ticing the method of introducing the instrument: 'I then turn the edge backwards, and with one stroke of the instrument, cut in halves both capsule and cataract. By repeated cuts in different directions, the opaque lens and its capsule are divided in many pieces, and at the same time I take particular care to detach as much of the capsule as possible from its ciliary connexion. As soon as this is accomplished, I turn the instrument in the same direction as when it entered the eye, and with its flat surface, bring forward into the anterior chamber as many of the fragments as I am able.'* It happens luckily for those who attempt such an operation that it cannot often be accomplished: a lens must be very soft indeed which could be cut across, and chopped into fragments, upon a structure affording so little resistance as the vitreous humour; if it yielded so easily under the edge of the knife it must also break under the needle in depression. Portions of cataract will certainly dissolve more rapidly when placed in the anterior chamber, because they are completely immersed in the aqueous humour, while in the posterior they have perhaps only one surface exposed; but it is absurd, and contrary to experience to suppose, that they cannot be dissolved behind the iris. I quote one or two passages from the work of Mr. Saunders to enable the reader to contrast his mild, delicate, and successful operation with the practice to which I allude:—'As soon as the needle has penetrated the tunics, he gently depresses its handle so as to direct its point towards the capsule through the thin edge of the lens, and steadily projecting its flat surface between the capsule and lens, he arrives at the centre of the capsule, which he opens, taking the same precaution as in the anterior operation, not to rend it extensively,

* See his work on Cataract, p. 255.

lest he should dislocate the lens. He now cautiously opens the texture of the lens, and withdraws the needle. In his subsequent operations, he will complete the central aperture in the capsule, and then loosen the texture of the lens, suffering the flocculi to fall into the anterior chamber, *but not projecting into it any considerable portions of the lens, for the process of its solution and absorption is best accomplished in its natural position.*'*

I must not, however, be understood to say that the fragments of the lens are in no case to be brought into the anterior chamber. A cataract is often soft and friable, falling almost to a powder under the needle; in such case the fragments necessarily fall into the anterior chamber, so as to fill it half way up, and are afterwards rapidly absorbed without producing inflammation: such are certain lenticular cataracts of a blue tint, not generally found in old persons. If, however, the fragments be larger than the head of a common pin they are liable to produce inflammation by pressing on the iris, which pressure can only be obviated by keeping the pupil completely dilated by belladonna, an object that cannot always be accomplished. I have frequently had an opportunity of witnessing the solution of cataract *in situ* after the capsule had been opened, and I could with a magnifying glass observe from day to day the change in form which occurred from the removal of particles of cataract, until at last a portion has disappeared, and left a passage for the light. In such a case I observed three several times, that when a small fragment fell out of the capsule into the anterior chamber, pain and slight inflammation supervened, and continued until the particle was absorbed. In cases of hard cataract I do not attempt to break up the lens, because it would certainly be

* Treatise on Diseases of the Eye, p. 147.

dislocated from its situation in the capsule in the attempt; I merely open the cataract, as directed by Mr. Saunders, and as much of the lens as I can with safety, leaving it for a future operation, when the lens shall be found softened, and capable of being broken down into small fragments.

Another circumstance which has interfered with the success of the surgeon in this operation, is his forgetting that much time is required to accomplish the absorption of a lens, and consequently neglecting to prepare his patient for the delay. In cases of congenital cataract Mr. Saunders says (p. 149): 'The number of operations which may be necessary to accomplish the cure of a congenital cataract will very much depend on the texture of the capsule and the size of the lens. It is frequently cured by a single operation, more frequently it requires two, often three, sometimes four, but very rarely five. This period of cure will of course depend on the same circumstances, Some are cured in a few days, the greater number in one or two months, in many the process is protracted to three, and in a few to four or even five months.' The common period I have found to be from two to five months; soft cataracts are of course more rapidly dissolved. Occasionally cataracts operated on in this way disappear in a few days, not from being absorbed, but, as I conclude, from falling down into a fluid vitreous humour; as I have observed to take place in eyes otherwise diseased, especially with a tremulous iris. I have learned to look upon such an occurrence with apprehension, notwithstanding that it is attended by an apparent cure. Surgeons frequently in their anxiety to obtain a speedy cure, sacrifice all prospect of success by too early a repetition of the operation. While the broken lens lies well in the posterior chamber, without pressing on the iris, the operator has reason to congratulate himself, and it is only when he

has ascertained that no change is taking place in the cataract, that he is called upon again to disturb it. He should be particularly cautious not to repeat the operation while any trace of inflammation exists.

If the surgeon determines to adopt this operation of opening the texture of the lens through the cornea, he has next to make choice of the instrument which will accomplish this object most effectually, and with least injury to the organ. I conceive that all that is required for this purpose is a fine point; a cutting edge or knife being only required where the lens is to be cut in pieces. I also consider that the needle should be curved at the point, to enable the surgeon to open completely the texture of the lens if it should prove soft or friable, and it should be so constructed that the aqueous humour shall not escape. It is obvious that these objects cannot be attained by the use of the old spear-pointed couching needle, or by the smaller needles of Hey or Scarpa, unless they are very much diminished in their proportions. The flat needle of Mr. Saunders, however successfully used by him, is objectionable on account of its straight form, and the impossibility of rolling it between the fingers to produce the effect of a drill on the lens. That the modifications of Scarpa's needle, recommended by Langenbeck and Guthrie, may be employed with the best effect, there can be no doubt; but I have to object to every needle fabricated by a cutler, that, however delicately the instrument may be formed, it is liable to leave a mark in the cornea, and when made very small to guard against this occurrence, can seldom be obtained of the proper temper and finish: if too soft they bend, or if too hard, break. To attain the desirable objects stated above, and to avoid the difficulties to which I have just alluded, I determined to try a fine sewing needle curved at the point, and after about forty operations I do not feel

in the least inclined to repent of my choice. I am on the contrary every day more and more satisfied that it affords peculiar and unquestionable advantages. It rarely, if ever, leaves even the slightest mark in the cornea. I could produce examples where it has been three times introduced, and where not the slightest speck can be detected; and I have introduced it through the very centre of the cornea without any bad consequence. When fairly introduced into the eye, it is capable of accomplishing any object to be attained by a needle. The capsule can be opened to any extent: a soft or friable lens can be actually broken up into a pulp, by pushing the curved extremity of the needle into its centre, and revolving the handle between the fingers; large fragments can be taken up on the point of the needle from the anterior chamber, and forced back out of the way of the iris, or if sufficiently soft, may be divided by pressing them against the back of the cornea with the convexity of the needle; a method which I have repeatedly adopted with advantage. When the lens has been displaced from the capsule, in consequence of the needle sticking in it in attempting to open its texture, I have, without removing the needle, placed the lens in the anterior chamber, and then extracted it; and in other cases have forced it back into the vitreous humour, out of the reach of the iris. From the fineness of its point, and the ease with which it can be turned and twisted in every direction, it enables the surgeon to deal most effectually with an opaque capsule; he may pick it with the point from any attachment it may have formed to the iris, or if it hangs flaccid he may entangle and detach it by pulling or twisting. In certain cases the pupil is found nearly closed, and adhering to a small cataract of nearly cartilaginous hardness; in these I have introduced the needle, and with the point picked up the adhesions between the margin of

the pupil and this hard mass, which I have then placed in the anterior chamber, and removed through an opening in the cornea, with a pair of forceps. It may be said that all this might be accomplished by a diminutive needle on the plan of Scarpa's ; but not, I conclude, with the same prospect of success, on account of the much greater size of even the smallest of such needles.

There is one difficulty attending the use of the round needle: it requires very considerable force to pass it through the cornea ; so much indeed as frequently to embarrass those who use it for the first time. I can, however, safely assert that very little practice enables the surgeon to surmount this difficulty. It is only necessary that he should be aware of the degree of force required, that force he is perfectly safe in employing. The surgeon who rejects an instrument which affords peculiar advantages, or refuses to adopt superior methods of operating, because difficulties in execution stand in his way, can never expect to obtain the character of a good operator. The greatest advantage in the use of the needle results from the very circumstance which causes the difficulty in its introduction, it is from its conical form firmly wedged in the cornea, prevents the aqueous humour from escaping, and in consequence of being thus fixed, gives the surgeon a power of holding the eye that defies every effort on the part of an unruly patient, unless he actually plucks out the instrument with his hand. If the head be suddenly drawn back the surgeon has only to let the instrument rest loosely on his hand, and follow the motions of the patient. I have seen the needle under such circumstances slip from the hand of the surgeon, and hang from the eye without serious mischief, the handle being very light.

The size of the needle is known in the shops as number *seven*, being the forty-fourth part of an inch in diameter,

about one-half the size of the finest Saunders's needle which is made. The point can be turned to the requisite curve by means of a pair of cutting forceps, or the ward of a small key; of course without heat, which would destroy the temper. It must not, however, be expected that all needles are so soft as to be bent thus cold: there may not be ten in an hundred of this temper, but when once turned they retain the curve without any danger of bending or breaking, and certainly possess a degree of strength and temper never observed in needles separately forged and finished by the best cutlers. They should always be tried before use by passing them repeatedly through thick calf-skin leather. After they have received the requisite curve, the point should be cut flat on each side, on a fine hone, and carefully examined with a magnifying glass to ascertain that it is perfect. The extent to which the point should be curved may be left to the choice of the surgeon, reminding him that the greater the curve the more effectual the needle will be when introduced, but the difficulty of introducing it through the cornea will also be greater. I therefore recommend those who use it for the first time to choose one slightly curved. After the point has been turned, the needle, held in the jaws of a pair of pliers or a vice, is to be run down into a cedar handle, without cement, leaving only *half an inch* of blade, which I have found to answer every purpose. If the blade be left longer it will yield and spring when opposed to a resistance. The handle should be about a fifth of an inch in diameter, and four inches long. I use the handles made for camel-hair pencils, and find that a metallic ferule, which increases the weight, is unnecessary and objectionable. A needle thus constructed, and preserved free from rust, will retain its point for a great length of time: I have used the same one a dozen times without sharpening.

The surgeon, provided with such a needle, places himself in the usual position with respect to the patient, availing himself of whatever assistance he may find necessary to secure the lids.* He then brings the point of the needle within a very short distance of the eye, and when the cornea is brought into an advantageous position, he suddenly strikes the needle into it near its circumference. As I do not apprehend any opacity from the wound, I am not very particular with respect to the precise point where the needle pierces; I generally, however, enter it sufficiently near the margin to obviate defect from this cause. The point of the needle once fastened in the cornea, the surgeon has complete command of the eye; no action of the muscles can disengage it, and there is no danger of the needle slipping into the anterior chamber; an elevator or ophthalmostat is therefore altogether useless. The operator now pushes the needle through the cornea, which frequently yields like wet leather, and the eye often turns so much toward the inner canthus that the pupil is hid, and he must rely upon his knowledge of the course which the needle necessarily takes, in order to conduct it to the lens. This is the principal difficulty to be surmounted. If the surgeon does not now steadily push the needle forward, whatever resistance he may feel, he will find, when the eye returns to its proper position, that the point of the needle is still merely entangled in the cornea. This also is the period of danger to the iris: if the operator does not keep the flat of the needle to that membrane, with the point

* Some ophthalmic surgeons recommend that the left hand be employed to operate on the right eye, supposing the operator to sit in front of the patient. I operate on the left eye sitting opposite to the patient, on the right standing behind him with the head resting against my chest; this latter position I find by far the most favourable and convenient.

down and the convexity up, he will be very liable to injure it. Should it happen that the point of the needle has passed through the iris, it may be easily extricated by gently drawing back the instrument without removing it from the eye. After the needle has been fairly entered, and that the operator sees its point at the opposite side of the pupil, he brings the cornea forward merely by pulling it upon the needle, to which it is completely secured, in consequence of the blade being wedged into its texture. He now turns the point directly back, and gently tears open the capsule, picking and scratching the surface of the lens with a rotatory or drilling motion of the instrument; not with the lever or cutting movement, which is necessary when Saunders's needle is used. If the lens be soft and friable, the fragments fall like snow into the anterior chamber, and the surgeon may deal very freely with it, pushing the needle deep into its structure, and twirling the point round so as to mash it into a pulp. If, however, it proves hard, and that he attempts to deal thus with it, he fixes his needle in its tough and glutinous structure, turns it out of the capsule, drags it against the iris, and makes it necessary either to extract it or force it back into the vitreous humour. As I have already observed, if the cataract be hard, the capsule should be opened, and the centre of the lens cautiously scratched with the point of the needle, so as to expose its texture to the contact of the aqueous humour, by which it is softened and fitted for breaking up on a future occasion. In withdrawing the needle the surgeon has to encounter the same description of difficulty which attends its introduction; it is tightly held by the cornea, requiring to be turned on its axis in order to extract it, as an awl is drawn from leather. It must not, however, be forgotten that this wedging of the instrument is attended with the great advantage of

enabling the surgeon to operate on the most unsteady eye without an ophthalmostat or elevator.

While advocating the merits of this instrument I am not ignorant of the proposal of Buckhorn and others to employ a round needle. I have not, however, been able to ascertain from the books what is the precise form and size of Dr. Buckhorn's instrument, and as I have not seen his Essay I must be excused if I have been repeating what he has already stated. Scarpa's needle is round in the stem, but it is spear-pointed, and consequently allows the aqueous humour to escape; a disadvantage that must attend the use of every needle so constructed. In the needle which I have been describing we have combined the advantages of a delicately small blade, of great strength and fine temper, inflicting so minute a wound that no mark remains in the cornea, capable of opening the texture of the lens as effectually as any other needle, and from its conical form, not permitting the aqueous humour to escape during the operation."

Since this paper was published, I have continued to practise this operation as described in it, and with the needle proposed, without interruption; scarcely deviating from the directions given, or resorting to any modification of the method laid down. Of the superior qualities of the needle I have not the slightest reason to change my opinion. It is, I am satisfied, by many degrees the best for the purpose. Its small size, great strength, and matchless temper, entitle it to a preference before all others as regards these qualities; while its cylindrical stem and the curvature at the point, fit it for application to any peculiarity. But I find all these advantages in the instrument overlooked, if not despised, by some, because it has not the imposing appearance of a finely polished blade in an ivory or ebony

handle with silver ferule; so much so, that the cutlers will not make it, or keep it for sale, and some of them have actually forged a tool to resemble it, in proportions more worthy of the trade, when called on for it by a customer. Now the truth is, that no cutler could forge, temper and finish such a blade with the slightest probability of equalling this needle, which acquires its temper by chance in the tempering of thousands of needles together. I have stated in this paper that not ten, I might perhaps have said five or six only, in a hundred of needles, are found with the temper which admits of their being bent without breaking, and enables them to preserve the *set* or curve given to them by the pliers. As to the strength of the blade, diminutive as it is, no fears need be entertained. I never yet broke one or saw one break in an operation; and, as I have said, it may be passed without danger through the stoutest leather. I should, however, remind the surgeon, that the blade, before being finally pushed into the handle, should be dipped in a solution of gum lac or sealing wax, in spirit of wine, as otherwise it may rust at the wood if laid aside wet, and may snap there in consequence. I have also to warn those fond of "improving" surgical instruments to suit their peculiar notions, that I do not answer for the performance of any needle of this description unless it has been constructed precisely as directed. It must be the needle No. 7 (being the 44th of an inch in diameter), half an inch long in the blade, from the wood to the point, and in a cedar handle of the specified proportions. If the blade be left longer it will spring in using, and if shorter, it will not reach as far as necessary.

With respect to the objection made to this operation on the score of its endangering the cornea, and causing opacity of that structure, I can with safety state that there is no-

thing in it. I never yet saw vision impaired by any opacity caused by the wound of the needle, and very seldom indeed have I seen any opacity at all remain. In fact, as I have said elsewhere, I know no structure in the body which bears simple injury, such as a clean cut or puncture, better than the cornea. In the course of a long practice, I have met but one case in which suppurative inflammation took place in the puncture, and in that case the suppuration and subsequent ulceration was confined to a circle not an eighth of an inch in diameter, and left behind an opacity not larger than the head of a pin, at a distance from the pupil, and consequently not impairing sight. I have also met with cases, but very rarely indeed, in which the whole cornea suppurated, and the entire eye participated in the destructive inflammation, as sometimes happens from any operation for cataract; this, however, I have never considered a consequence of the peculiar nature of the puncture in this peculiar structure, but the result of constitutional derangement operating on local inflammation following injury. In fact, I looked upon it as of the same nature as the abscess of the cornea which follows very slight injury or irritable ulcer, and which takes place, not from the mere injury or ulcer, but from that state of the animal economy, whatever it may be, which is attended by these local destructive processes. But as I have said, this is a very unusual consequence of this operation; so much so, that I have often wondered that it does not occur more frequently, seeing that it so often follows slight wounds of the cornea by particles of stone or steel in stone-cutting or metal turning. I repeat therefore emphatically that the surgeon need never be deterred from operating through the cornea by any apprehension of the effects of injury on this more than any other structure in the body he may be called upon to divide.

In the preceding paper and elsewhere, I have asserted the superiority of this the anterior operation through the cornea to the posterior operation through the sclerotic, and have not hesitated to say, what I now repeat, that the latter method is a disgrace to surgery, notwithstanding the preference given to it by many surgeons. No anatomist, aware of the nature and number of the structures injured in the posterior operation, can for a moment assume that such injury does not cause more risk of destructive inflammation than the injury inflicted on the cornea in the anterior one; and no surgeon who has compared the effects and consequences of the two operations can for a moment maintain that the results of the puncture through the sclerotic are not more injurious than those following the puncture of the cornea. No man who knows what the penetrated structures are could venture to maintain that the conjunctiva, sclerotic, ciliary ligament and ciliary processes, could be traversed by an instrument with the same or less injury than is inflicted in traversing the cornea; and no man who has compared the dimensions and relations of the anterior and posterior chambers of the aqueous humour, could venture to maintain that the narrow space behind the iris affords a more accessible passage for the needle than the comparatively capacious chamber anterior to it. Neither can any man who has witnessed the sufferings caused by this posterior operation, or the destructive consequences of the inflammation which it produces, venture to assert that such mischief follows the anterior one. The truth in fact is, that this most valuable of all the methods devised for the removal of an opaque lens has been brought into discredit and almost into disuse by this bigotted preference of a method handed down to us from a remote antiquity, when surgery was in its infancy and anatomy not yet cultivated. I have every day to

listen with wonder and no small vexation to the expressions of want of confidence in the operation for cataract, uttered, not only by patients, but by practitioners; and this I find is to be attributed to the experience people have had of the consequences of this bad method. I know that other causes operate to diffuse and perpetuate these prejudices and misconceptions; that in fact they are fostered by feelings of jealousy and that spirit which leads men to decry what is successfully practised by rivals; but the foundation of these representations is the frequent failure of this posterior operation and the sufferings patients have undergone in consequence of it.

In the performance of this operation I have adopted some modifications since this paper was published. Instead of operating on the left eye standing in front of the patient, I now operate on both eyes standing behind him. This position as regards the left eye may seem to some a strange one, but I was induced to adopt it to enable the hospital pupils to see all the steps of the operation, which they could not if I stood in front, and I now find that it is the preferable position. It gives the operator the most perfect command over the patient's head and eyelids, and enables him to bring his eye to bear on the needle and cataract with the utmost precision. Moreover, it renders him independent of an assistant who, in eye operations, should, if possible, be dispensed with. I seat the patient in a chair and make him sit straight up or inclining, according to his height. If very tall I raise myself by standing on a large book or two, or on anything which answers the purpose to be found at hand. In my own place of business I find old medical folios answer the purpose well: operating chairs, although very imposing and calculated to produce effect, I have not adopted; not finding myself at ease with such things. When he is seated I lay

the patient's head against my chest, and placing the middle finger of my left hand on his lower and the forefinger on his upper eyelid, and gently holding the eye between them, I strike the point of the needle suddenly into the cornea, about a line from its margin, and there hold it until any struggles of the patient, which may be made, cease. There must be no hesitation here, for if the cornea be touched without fixing the point of the needle in it, the eye will turn rapidly and the surface will be scratched. I advise the operator to pause here for a moment, holding the eye firmly and steadily on the point of his needle, and if necessary to say a word of encouragement or remonstrance to the patient. After quietness becomes restored, the needle is to be pushed on with a firm hand through the cornea into the anterior chamber, directing its point downward and backward to the centre of the surface of the lens. This is the most difficult step in the operation, and that part of it which requires most confidence in the instrument. If the surgeon now hesitates from the feel of resistance experienced he will not succeed. He must push on, fearless of consequences, until the needle passes through: in doing so, however, the eye will often turn from him or yield before the pressure, even until the pupil, iris, and the cornea itself are hidden under the eyelid; still he must push on until he is satisfied that the needle has fairly entered the anterior chamber, when he relaxes the pressure and allows the eye to recover its natural position. Here, again, he had better pause a moment to allow the patient to recover his composure, which is often disturbed in this the roughest step of the operation, and also to ascertain the distance to which the needle has passed, and how the point lies as to the margin of the pupil. If it has passed so far that the point cannot be brought into contact with the lens without touching the

iris, it must be gently pulled, and at the same time slightly rotated, until the point is brought within the circumference of the pupil; and if it has passed through the iris, which sometimes happens when the pupil has not been fully dilated by belladonna, it must be gently pulled and rotated in the same way until disentangled from that structure. This, however, is a nice manœuvre, requiring great delicacy of manipulation; for if too much force be used, the needle is withdrawn entirely from the eye. Whenever this accident has happened to me, and it has been very seldom indeed, I have at once passed the needle in again and finished the operation; but beginners may not be able to do all this, for the escape of some aqueous humour leaves the cornea flaccid, and therefore tough under the instrument. Some may think that this danger of wounding the iris is a capital objection to the operation, but it should not be so considered, for the accident seldom happens, and when it does there is no great harm done. I have never found any mischief from it. The needle, however, having been fairly introduced, is now to be turned so as to bring the point to work on the opaque lens. If the cataract be a hard one, the surgeon must pick up the face of it by repeated delicate touches over every part of the surface; and keeping in view the necessity of completely detaching the anterior portion of the capsule, for fear of subsequent adhesions of it to the iris and consequent capsular cataracts, he will use the needle very freely for this purpose. Here, however, he must be on his guard, for if he dips the point too deeply into a hard lens, it will stick there, and with the next motion of the instrument the cataract will be entirely detached from its bed on the vitreous humour, twirled round, and perhaps placed, through the pupil, in the anterior chamber. Should this, however, happen, the operator need not be dismayed. The same handling of the

needle which brought the lens into this position will bring it back again. He has only to stick the needle in it, and with a steady hand replace it in its original position: the iris, with a fully dilated pupil, offers no obstacle. In dealing with hard cataracts, I have frequently picked up the face of the lens and then turned it round and picked up the back. I know that many surgeons, and perhaps the majority of oculists or ophthalmologists, will think that all this rough work is a very dangerous proceeding; but the truth is, that if the lens be kept away from the iris, so as not to press upon that highly organized and exquisitely sensible structure, the eye will bear a great deal without subsequent destructive inflammation. This, however, suggests an inquiry as to the final disposal of the remains of the hard lens, after all that can be broken up has been detached. Since the preceding paper was published, I have learned to dispose of it more advantageously than I then did: I force it down into the vitreous humour, and, in fact, depress or recline it, thus combining the two operations of breaking up and couching. I was for a long time adverse to the operation of depression, from a consideration of the amount of injury necessarily inflicted by tearing through the vitreous humour, and of the amount of inflammation liable to ensue from the presence of the lens, equivalent to a foreign body in that structure; but repeated trials have convinced me that it can be done with much less danger of bad consequences than may be supposed. The operation of couching, notwithstanding its antiquity, must I think now rank the last of the three operations for cataract, judging from a comparison of results; but this I am inclined to think has arisen from the injudicious selection of the sclerotic as the place of puncture, or in other words, from the preference given to the posterior operation. Be this, however, as it may, I now

find that picking up, opening, and detaching, the soft surface of the lens, and then completely depressing the remaining hard nucleus, is a safe and successful operation. But some will very naturally ask how it is possible to depress a lens through the cornea with a needle half an inch long and a forty-fourth of an inch in diameter? All the reply I have to make is that it can be done very easily, and that I am constantly in the habit of doing it. As soon as the surface of a lens has been opened in texture and all the soft part detached from it, I then lay the convexity of the curve of the point of the needle upon it and force it down through and into the vitreous humour. In doing so, however, this delicate needle gets entangled in it, and in withdrawing the instrument the cataract is brought up again, unless the surgeon, while the lens is down, rotates the needle a little, inclines it here and there, and as it were shakes it off the needle. But do what he will the lens will often rise as it will in any operation of depression, and must be sent down again by a repetition of the manœuvre, until it remains down. Should it, however, rise after the operation has been finished, the case generally does well, because a bed has been made for it in the vitreous humour far from the iris, but recovery of sight is delayed until the solution of the cataract, which thus still, more or less, obstructs vision, takes place. I have to add, that in operating on the right eye I generally require one finger of an assistant to hold down the lower lid.

The value of preparatory and after-treatment as part of the surgeon's care in cataract operations has been fully appreciated, and, in practice, amply made available; but the value of a respectful consideration of all the functions of the animal economy upon which health depends has not been so well understood. It is assumed that a patient should be prepared for an operation by taking physic and

abstaining from food, yet a rational man acquainted with the consecutive operation of each apparatus provided for the growth, repair, and preservation of the living being may well doubt the correctness of such a view. The universal faith reposed in the practice of giving and taking physic has led practitioners not only to place too much reliance on that resource, but to resort to it sometimes to the injury of the patient, as I find in the case under consideration. In preparing a patient for operation, I do not act on the belief that empty bowels are essential to health, or that what are called *fæces* should not be found in the intestinal canal; on the contrary, I proceed on a conviction totally different. If a patient be in good health, notwithstanding an habitual retention of the contents of the bowels beyond the prescribed periods, I do not wish to risk an interruption of health by disturbing the natural functions of the stomach and bowels, and I therefore refrain from giving physic. But if the patient be not in good health, I of course endeavour to bring him into that condition by every means in my power, and resolutely resist every attempt to induce me to operate until I have accomplished that object. Above all things, the state of the digestive organs should be carefully studied, and if found defective, if possible, repaired. Nothing seems to require more attention than the state of the tongue as indicative of the state of the stomach and bowels. If it be white or coated with discoloured adhesive mucus, the functions of assimilation and nutrition are probably imperfectly performed, and a resulting tendency to destructive inflammation from local injury is engendered. This I see every day exemplified in accidental injuries of the cornea in stone-cutting, and in chipping and turning metals. If the patient has a clean tongue, and is otherwise free from disease, little inflammation, and still less of destructive inflammation,

follows the injury; but if the tongue be coated with a thick yellow adhesive layer, ulceration and formation of purulent matter often ensues. In preparing a patient for operation for cataract, this will therefore demand the first care of the surgeon; especially if he finds, as he often does, a deposition of lithates or other salts in the urine. He will also make inquiry as to the state of the discharges from the bowels, as to their colour, consistence, and proportion of undigested materials, and also as to the frequency of discharge; not looking upon what is called costiveness, as evidence of deranged digestion, but rather the reverse: undigested food seldom remaining so long quiet in the alimentary canal as the insoluble remains of thoroughly digested aliment mixed with the excrementitious part of the bile. This inquiry is not, however, so easily made as those who are satisfied with loose statements suppose, and many may think it unnecessary; but convinced as I am that attention to this matter is necessary for the success of the operation, I dwell upon it. Every practitioner has his own way of correcting this derangement of the digestive organs; it would therefore be superfluous to enter here into details on the subject. I myself generally rely on a moderate purgative pill with blue pill or calomel at night, followed by some aromatic bitter infusion, containing a little alkaline salt, in the morning and middle of the day; at the same time regulating the diet by restricting the quantity and quality of the food, as well as the periods at which it should be taken. It is usual in preparing for this and other operations to make great alterations in diet, substituting liquid for solid, and vegetable for animal aliments. This, however, must be done with caution, leading as it inevitably does to disturbance of the digestive function and interruption of the assimilating and nutritious processes, if suddenly or exclusively adopted. Without digestible nu-

tritious food good chyle and blood cannot be produced, and without good blood local injuries are liable to suffer from destructive inflammation. Even in the case of old persons habitually indulging in a glass of wine or other alcoholic stimulant, the suspension of that supply of temporary aid to the nervous system should not be suddenly adopted: in fact, the substitution of "low living," and what are called "slops," for generous diet, should be gradually and sparingly practised, if practised at all. In my own practice, I resort to it as little as possible, and from experience feel inclined to resort to it less and less.

In particular cases, the surgeon may be called on to prepare his patient for operation by special direction of remedies to specific derangements of health. Persons of languid circulation and feeble frame must be invigorated by generous diet and tonic medicines, while those of plethoric and bloated habit must be reduced to more suitable condition. Scrofulous or rheumatic constitution or diathesis must, if possible, be corrected; and specific disease of any kind, if present, removed. All this, however, is more easily suggested than accomplished. Scrofula or rheumatism are not so easily eradicated, but it is well, with a view as much to general treatment as to prognosis of the result, that this consideration should be kept in view. When called on to operate on a truly scrofulous or rheumatic patient, the surgeon must be careful to warn the parties concerned that the prospects of complete recovery of sight are less favourable than in cases where the health is good. The after-treatment must be conducted on the same principles as those laid down for the preparatory treatment. The tone of the stomach should be preserved, assimilation and nutrition duly maintained, and the general condition of the patient made comfortable. There is no necessity for immuring a patient after this operation in

a close and darkened room. The less of bed the better, and the sooner the drawing-room is made the place of convalesence the better also. With elderly ladies, and especially those of weakly nervous system, this cannot perhaps be so soon done; but the sooner it is done the more rapid and certain will be the recovery. Should inflammation arise, it must of course be arrested, if possible, by the usual means, judiciously adjusted to the constitution and condition of the patient. Indiscriminate purging, bleeding, and mercurializing must not be permitted; but if depletion becomes necessary, it must be carried to the requisite extent without undue severity. The surgeon should not act on the assumption, that if pain and redness be present, destructive inflammation must be in progress: the pain is generally from the pressure of fragments of the cataract on the iris, and the redness often from trivial inflammation of the conjunctiva. Whether it be from this conviction respecting the harmless nature of slight inflammation and pain, or from this operation through the cornea being seldom followed by destructive inflammation, I do not find that I am often called on to draw blood either by lancet or leeches. I am now, however, alluding more to the inflammation which may come on immediately after the operation than to that which may come on at a more advanced period, and which is often of more destructive character on account of its implicating the whole eyeball; assuming a chronic, and sometimes an intermitting, and even a neuralgic character. This inflammation must be treated as other inflammations of the eyeball, and as I have laid down in my treatise on that subject. A strange proposal has been made, probably in consequence of the frequency of destructive inflammation after the *posterior* operation. It has been not only suggested, but actually practised, to administer mercury to a patient previous to operation, so

as to have him in a state of salivation, or on the point of salivation, at the time when inflammation is liable to come on. It is not necessary to warn the surgeon against the adoption of any such puerile application of theoretical assumption. Every one knows that the presence of mercury in the system does not prevent the occurrence of inflammation; and the sooner every one knows that mercury is not so certain an antidote against destructive inflammation as people believe, the better. While considering the after-treatment in this operation for cataract, it is necessary to allude to an occurrence which often takes place, and which causes much distress and alarm both to patients and friends. This is a distressing nausea and vomiting which seizes the patient, generally in the middle of the night of the day of the operation, and continues for many hours, and even more or less during the next day. I attribute it to the pressure of the fragments of the broken-up lens on the iris, and find that it is not followed by destructive consequences; but causing, as it does, so much distress and alarm, I generally order an opiate to be taken when it commences, or direct the attendants to be prepared with some effervescing draughts, and to assure the patient that there is nothing unusual or dangerous in the occurrence. I know not whether this remarkable effect has been observed by others or not, or whether it has been recorded in books, and I have not at this moment time to inquire; but I am sure that I have always noticed it in my lectures. As to local applications, the great object of their use should be to dilate, and keep dilated, the pupil, so as to place the iris more out of the reach of the pressure of the fragments of cataract. This is, of course, to be effected by the application of extract of belladonna; but as there seems to be some mistaken notions prevalent respecting this most valuable and remarkable agent, it may be desirable to cor-

rect them. The pupil is, of course, to be dilated previous to the operation to expose the lens fully and to place the iris out of reach of the needle. Some think it necessary to daub the whole eyebrow, lids, and half the cheek with the black extract, and to leave it adhering to the skin for several hours: some even lay it on the night before. This is a great waste of the medicine, and soils the skin and linen. It is astonishing what a small quantity of this most wonderful agent will dilate the pupil, especially in the eye of a young person. One grain of nitrate of atropia, dissolved in an ounce of distilled water, will form a solution, of which one drop from a camel-hair pencil will dilate the pupil fully in fifteen, twenty, or thirty minutes: a drachm of good extract of belladonna to an ounce of water will do the same. I therefore always use these solutions in this way, putting in the drop at any time most convenient in the course of the day on which I operate. The application is neither very painful nor irritating, perhaps about as much as a weak solution of common salt, and leaves no redness after half an hour. I should observe, that in aged persons this application of the narcotic to the conjunctiva is sometimes absolutely necessary to secure full dilatation of the pupil. The smearing of the extract on the harsh skin in such subjects will not always effect the object. After the operation, however, the lids and brow should be painted with the extract to dilate the pupil and keep it dilated; because it may not be desirable to cause any additional irritation by dropping the solution on the conjunctiva. This is a very necessary precaution, for the surgeon should know that, however perfectly the pupil may be dilated before the operation, it generally becomes contracted again during the revolutions of the needle: in fact, mechanical irritation, such as the pressure of the needle or the broken fragments on

the iris, causes that organ to act and the pupil to return to its original dimensions. This is a remarkable physiological fact, which I have not seen recorded, but which I have for many years demonstrated in the operation theatre. By way of dressing, I leave a lotion containing a couple of drachms of good extract of belladonna in eight ounces of water to be constantly applied as a water-dressing with a small scrap of old linen as light as a feather, but I strictly interdict all tying or bandaging, and direct the attendant to allow the rag to fall off when the patient turns to sleep.

It may be considered that I should state in detail the results of my practice of this operation, but as I have not been much in the habit of keeping regular records of my cases, I cannot do so. I can, however, with truth aver, that when properly performed upon healthy subjects, and patiently followed up by careful watching during the process of solution and absorption, it is an eminently successful operation. I know that the same is said of the operations of extraction and depression, but from what I have seen and heard of extraction as performed by the best operators in Europe, I have no doubt that the needle thus used will afford more cures than the knife. If it be true, as is asserted, that the losses of eyes by extraction amount to forty, thirty, or even twenty per cent., I have only to say that there should be no such loss by the operation of breaking up through the cornea. The truth, perhaps, has never been told with respect to the result of cataract operations, and perhaps never may be told, so great is the temptation to exaggerate where a man's fame and bread depends upon his success; but I repeat, that my experience of this operation fully justifies me in asserting that it is the best of the three. As I have already said, the metropolitan operator must lean to the operation of extraction because he cannot detain his patient in the city until cured by the

process of absorption; but the surgeon who takes an honest interest in the welfare of his patient will probably sacrifice the chance of the *éclat* attending success to the greater certainty of a cure. By way of example of the results of this operation, I shall briefly enumerate a few cases which I happen to have on hands this moment. A gentleman, aged between 50 and 60 years, with a hard cataract fully formed in the left eye, and one forming in the right, has just gone to the country able to write a legible and fair letter after the operation of breaking up and depressing. He was operated on three months ago, and could see imperfectly through an open pupil after three weeks or a month, and after three weeks more could write with cataract glasses, notwithstanding occasional interruptions from a nebulous condition of the cornea caused by chronic vascularity of the conjunctiva. This gentleman had never an hour's inflammation requiring serious attention. An unmarried lady, aged about 50, had both eyes operated on ten weeks ago. The lenses were soft and were broken into a complete pulp, which fell, partly, into the anterior, and partly, into the posterior chamber of the aqueous humour. There was severe nausea and vomiting the night following the operation, and some pain occasionally as the fragments fell against the iris, but no inflammation. She is now able to read and write with a cataract glass to the left eye, the pupil of which is entirely free from cataract. In the right eye there is still as much broken up lens as fills up the space behind the pupil, but it is rapidly dissolving, and I am satisfied that she will require no repetition of the operation. About eight weeks ago I operated on a young gentleman for capsular cataract, the result of a penetrating wound of the eye inflicted a long time since. He is aged about 12, and sat in a common chair while I operated with a shawl tied round his arms, body,

and the back of the chair. The capsule, with some remaining portion of the lens, was freely torn and detached, and the child sent home. He continued to attend daily, not the slightest inflammation following, but was attacked by scarlatina, which nearly terminated fatally. His pupil is now nearly free from broken lens, and I consider him safe as to his vision. In the hospital I operated on a delicate boy, aged 14, and five years blind with soft lenticular and partially opaque capsular cataracts. The operation was performed two months ago, the capsules freely torn and detached, and the lenses made into a pulp. He had nausea and vomiting, but no inflammation after the operation. His pupils are now completely clear, and he is able to walk about without glasses and to read with them. A labouring man, aged 37, was operated on for soft lenticular cataract of the right eye about twelve weeks since. He had lost the left eye from a blow of a stone, and I suspect his cataract in the other eye was caused by sympathetic inflammation. Notwithstanding the difficulties presented by a small sunk eye, very difficult to be brought to a steady state, the lens was freely opened and a hard nucleus of it depressed. The pupil was soon clear, but the remainder of the hard nucleus, still undissolved, rose with the motion of the head occasionally towards the axis of vision: it, however, finally dissolved without any other operation, and he now sees well with it about twelve weeks after the operation. A girl, aged 17, operated on about three weeks ago for thick and tough capsular cataract of the right eye, has now an open pupil, but she cannot see. I was induced to give her the chance of an operation by the importunities of her friends, which I should not have done, because it was a case of opaque lenses with adherent pupils and other proofs of previous destructive inflammation; but I was tempted to do so from the

state of the eye, the pupil being closed by capsular cataract only, remaining after an operation by another surgeon. Notwithstanding, however, the disorganized state of this eye from the previous destructive inflammation, no inflammation followed the operation; and if the retina had not been rendered insensible, and the eye consequently amaurotic by the same disease which caused the cataracts, she might now have good sight. The worst case I have on hands is that of a man, aged about 35, who had lenticular cataracts of the firm consistence (neither hard nor soft) usually found at this period of life. The operation was performed on both eyes about six months ago, and was not followed by any untoward symptom, but some weeks after he had a severe attack of acute rheumatism, followed by severe rheumatic inflammation of the left eye, which closed the pupil; and he subsequently suffered severely from psoriasis, from which he is now scarcely recovered. The pupil of the right eye is, however, free from cataract, except some threads of opaque capsule, which I propose to remove; and the left eye looks so well that I intend to give him the chance of an operation for artificial pupil on it. From these cases the surgeon can form some opinion as to the practical results of this operation. They present the general effects of the practice, and certainly do not afford more favourable examples than an average would supply. I have no wish to indulge in any exaggeration respecting the success of this method: I am writing for surgeons, who will, in the sequel, pronounce a verdict upon it from their own experience, and thereby verify or disprove my statements. Malicious persons will say that I advocate this operation because I cannot perform that of extraction as easily; but I can perform extraction as well as other people, and refrain from it only because it is in its nature

a most formidable operation, and in its results a most hazardous one. In principle, too, it is not creditable to surgery. To cut open a man's eye, in order to squeeze out his crystalline lens through the incision, when that lens can be removed by absorption, I hold to be contrary to the rule which binds the surgeon to give his patient the best chance of recovery regardless of present inconvenience or delay. But whatever view may be entertained on this subject, I am firmly convinced that the operation of extraction should be restricted to hard cataracts in aged persons. Under fifty years of age, the crystalline lens once broken in pieces, must be sooner or later dissolved and absorbed. There can be no question as to the result; it is only a question as to time.

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