

**Observations on a mode of making the incision of the cornea, for the extraction of the cataract / by James Wardrop.**

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OBSERVATIONS  
ON,  
A MODE OF MAKING THE  
INCISION OF THE CORNEA,  
FOR THE  
EXTRACTION OF THE CATARACT

BY JAMES WARDROP.

LONDON:

PRINTED BY W. BULMER AND CO. CLEVELAND-ROW,  
ST. JAMES'S.

1818.

OBSERVATIONS

A MODE OF MAKING THE

INCISION OF THE CORNEA

EXTRACTED FROM THE

AT JAMES HARRISON

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## OBSERVATIONS, &c.

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**T**HE following Observations are written, with the view of pointing out some of the inconveniences which arise, when the Incision of the Cornea is made in the manner recommended by most authors, who have written on this subject, as well as of describing a plan of operation calculated to remove them.

Perhaps there is no operation, the principles of which are more ingenious, than that for the Extraction of the Cataract. Its present state of perfection however, is not to be altogether attributed to the ingenuity of its original inventor. It has arisen from the gradual introduction of improvements, made on the various parts of the operation by different individuals; and though it is every day practised with the happiest success, still it is by no means without its difficulties; and accidents occasionally arise, which more or less destroy the good effects that might have been reasonably expected from it.



To remedy these, in one part of the operation, is the object of the alterations which are now proposed.

The most celebrated surgeons of the present day have directed, that the incision of the cornea be made semicircular, forming a line close and parallel to the external circumference of its inferior half (see Fig. 1. of the Plate) ; and in making the incision, the knife, except where the perpendicular puncture is made on entering the cornea, is directed to be carried on in the same plane with the iris. The cornea being of a very considerable thickness, nearly three lines, a great part of the incision will be necessarily carried through between its laminae, and therefore the length of the incision of the internal lamina, will be much less than that of the external one: This will be still more clearly explained by examining Fig. 2, where, besides the external form or line of incision (a, a, a,) I have drawn a second line (b), intended to represent the incision of the internal lamina; the dark space, therefore, included between these two lines (b and a), represents that portion of the incision which is made between the laminae.

The disadvantages which arise from this mode of operating, are the following :

1st, The external form deceives us in the



extent of the internal incision, and much more difficulty is met with in bringing the lens through it than, *a priori*, might have been expected; for as the line of the internal incision has only a very slight curvature, the thickness and tension of the cornea allows the edges of the wound to be only a little way separated from one another.

*2dly*, When the cornea is divided near its union with the sclerotic coat, and when the aqueous humour and lens have escaped, the portion of the iris opposite to the centre, and most depending part of the wound, loses the natural support given to it by the cornea, and is pushed forward, so that it comes in contact with the cornea, and even insinuates itself between the lips of the wound: thus the iris and cornea form permanent adhesions, in consequence of the inflammation which always follows the operation; the pupil becomes of an irregular form, and contracted, is drawn from the centre of the eye-ball, and retains but a very limited sphere of contraction and dilatation.\*. (See Fig. 10.)

\* In making the incision of the cornea, it is of importance that, on the one hand, it be not too small, so as to impede the ready extraction of the lens; on the other, that it be not so large, as, by taking away the support of the iris, to allow its edge to be pushed into contact with the wound. See Richter's *Anfangsgründe der Wundartzneykunst*.



*3dly*, The contraction of the muscles of the globe pressing forward the contents of the posterior chamber, are very apt to push a portion of the vitreous humour, both through the pupil and wound of the cornea ; and when this happens, the pupil becomes irregular, the form of the eye-ball is somewhat altered, and the prolapsed vitreous humour inclosed in its capsule, appears externally in the form of a small round transparent tumour.

*4thly*, As the external edge of the semicircular flap is very thin, and lies loose, the smallest movement of the eye-lids, particularly of the upper one, is apt to raise it out of its proper situation ; and thus that speedy union is prevented, which would take place if the two divided surfaces were kept in accurate and constant contact.

*5thly, and lastly*, As the internal edge of the incision is frequently and unavoidably made nearly opposite to the inferior margin of the pupil, and as all the extent of the cut surface, (a, b, Fig. 2), sometimes remains opaque, after the wound has healed, the opacity of the cicatrix must diminish the sphere of vision. With a view of illustrating these observations, two drawings (Fig. 9 and 10.) are annexed, taken from eyes which had been operated on by a very able oculist, the late Baron Wenzel. In Fig. 9, it

# Plans of the incision of the Cornea.

Fig. 1.

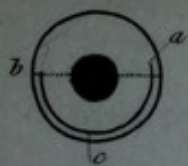


Fig. 2.



Fig. 3.



Fig. 4.

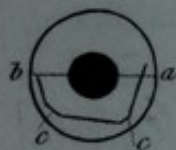
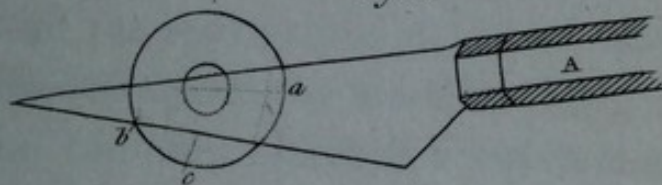


Fig. 5.



## Drawings of the cicatrix of the incision of the Cornea.

Fig. 6.



Fig. 7.



Fig. 8.



Fig. 9.



Fig. 10.



Fig. 11.





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is evident, from the form and breadth of the cicatrix, that the knife had passed between the layers of the cornea; and as the opake lens was still remaining, the operator had, in all probability, found that, from the smallness of the internal incision, it was impossible to extract it. The cicatrix in Fig. 10. also shows the extent of the space through which the knife had passed between the lamellæ of the cornea, and from the natural support which is given to the iris by the cornea having been destroyed, the pupil is drawn down from the centre of the eye-ball, and is much contracted.

All these disadvantages, in the usual mode of making the incision of the cornea, appeared to me to arise chiefly from the want of a sufficient portion of cornea being left at the inferior part of the wound, to support the iris and to prevent the pressure of the parts contained within the eye-ball, and the occasional action of the muscles, pushing forward the iris towards the wound of the cornea: I therefore conceived, that if the incision could be made in such a manner, that a larger portion of cornea could be left at the inferior part of the wound, and that, if, at the same time, it was made of such a form as to allow the easy extraction of the lens, a considerable improvement would be made in the operation. With this view, I made the incision in the following manner ;



The best knife for the purpose is that of Mr. Beer, of Vienna, by whom it is employed for the common operation. The blade is of a simple triangular form, the back being one continued line from the handle, (a, Fig. 11.) Its point should be made firm, and the blade should turn gradually thicker from the point towards the handle. The back of it should not be left square, but rounded off and smooth. Having previously oiled the knife, to make it cut more keenly, its point is to be thrust through the cornea, a little above its transverse diameter, and one line from its margin, in a direction as if it was to pass through the pupil, or nearly perpendicular to the spherical surface of the cornea (Fig. 3. and 5. a). When it reaches the plane of the iris, the blade is to be moved a little upon the incision which is already made, as a fulcrum, so that the point is elevated and turned towards the opposite side of the cornea. It is then to be carried forward, and a little obliquely downward, so that the cornea is again punctured at its transverse diameter, and at the same distance from the sclerotic coat at which it had been entered on the opposite side. (Fig. 3.) By these two incisions, the blade has cut perpendicularly, or very nearly so, to the spherical surface of the cornea, and the gradual thickening of the knife, by filling up the wound as fast as it is made, prevents the aqueous



humour from escaping. The eye is now completely secured by the knife, and the incision is to be finished by turning round the blade on its axis, thus keeping the edge turned outwards, in such a manner, that the remaining part of the incision is a straight line, and, therefore, nearly perpendicular to the lamellæ of the cornea (Fig. 3. c). If none of the aqueous humour has escaped before this last step of the incision is begun, it is sometimes necessary to withdraw the knife a very little, to allow a drop of it to escape, before the knife can be turned on its axis.

Supposing, therefore, that the cornea, instead of being a spherical, was a plane surface, the incision now described would be represented by (Fig. 3. a, b, c.); but as it is a segment of a sphere, the form will more resemble that in (Fig. 4.); at least this is the form of the incision which the operator should have in view to make when performing the operation.

By the inspection of these figures, (Fig. 3. and 4.) it therefore appears, 1st, That a large portion or ring of the cornea is left attached to the sclerotic coat, and must form, from its thickness, a complete support to the iris.

2dly, That as the incision is throughout nearly perpendicular to the lamellæ of the cornea, the length of the incision of the internal



layer will be greater than when it is made in the usual manner, and equal to that of the external one; consequently, the lens will be more easily extracted through it.

*3dly*, The upper edge of the internal incision is also further below the edge of the pupil.

*4thly*, As the flap is very small, the edges thick, and not easily moveable, or apt to be caught by the motion of the eye-lids, the lips of the wound are not liable to be displaced, and, consequently, the wound has a much better chance of uniting by the first intention.

And, *lastly*, The cicatrix which remains is scarcely perceptible, and cannot be distinguished when the cornea is looked upon in a direction perpendicular to its surface.

The incision should be made so that the inferior edge of the wound (c, Fig. 3) is half way between the circumference of the cornea and edge of the pupil, supposing the pupil to be in a moderate state of dilatation. If it be made nearer to the sclerotic coat, then the advantage to be expected from this mode of operating will be lost; and, on the other hand, if it be made at too great a distance from the sclerotic coat, and, consequently, too near the pupil, the iris will be apt to fall forwards, and a portion of it pass through between the lips of the wound. In one case, in which this accident



happened, the wound was long of uniting, and, after it was healed, the pupil remained very irregular and contracted.

In making the incision of the cornea in this manner, another circumstance also particularly deserves notice, which is, that on giving the knife the motion round its axis, after having punctured both sides of the cornea, there is a great risk of the iris turning over its cutting edge, some of the aqueous humour having generally by this time escaped. An operator who meets with this for the first time, is apt to think a wound of the iris inevitable ; but if he cautiously stops the progress of the knife, and presses the iris from its edge, by gliding the point of his fore-finger over the cornea, the incision may be completed with perfect safety.

I should not omit mentioning, in this place, the great advantage to be derived by having the eye-ball properly fixed before attempting to introduce the knife. I suppose the upper eye-lid firmly secured by the fingers of an assistant, or by Pellier's speculum, and the fore and middle-finger of the operator's left hand placed within the eyelid, in contact with the eye-ball, pressing firmly in the corner of the eye the *middle* finger, to prevent the ball rolling inward. When first touched with the point of the knife, the eye generally starts ; I have, therefore, made it



a constant rule, to touch the eye gently, or to give it little strokes with the back of the knife, as long as it starts or remains unsteady; but the moment it appears fatigued and fixed, I draw the back of the knife with great caution along the surface of the cornea, till the point arrives at the exact place where it is intended to penetrate, and then, with some quickness and firmness, push it into the anterior chamber.

In fixing the eye, likewise, great advantage is derived by making the assistant press considerably on the ball, whilst the knife is made to pass through both sides of the cornea: but whenever this part of the operation is completed, all pressure ought to be carefully guarded against, and the upper eyelid merely supported.

I have found the incision, such as has now been described, to fulfil completely my expectations, after having been in the constant habit of performing it for many years. I have also observed, in some persons who have been operated on by the most able Surgeons, that the incision of the cornea was by no means of the regular semicircular form, nor was it so near the circumference of the cornea as is recommended; notwithstanding the lens in these cases was readily extracted and the pupil remained perfectly regular. This most frequently happened in eyes



which were operated on with the left hand : I therefore did not consider it as the aim of the operator to make the incision of such a form, but rather as an accident occasioned by the difficulty, which most people find in using their left hand.

The observations of Professor Maunoir of Geneva,\* by which he attempts to show, that the cornea often mortifies in consequence of the incision being made too large, or larger than a semicircle, I do not think are altogether satisfactory. The cases from which these conclusions were drawn are too few, and they seem to me to be only examples of the violent inflammation which sometimes follows the operation, producing abscess, ulceration, and destruction of the organization of the cornea, effects which must have been observed by all experienced surgeons. A very different series of symptoms might have been expected from a mere death of the cornea, in consequence of a want of supply of blood by a division of its vessels. Indeed, in the only case, in which I ever had an opportunity of observing any effect at all analogous, the flap of the cornea did not adhere to the opposite side, a continual discharge of the aqueous humour took place, but none of the violent

\* See the Edinburgh Medical and Surgical Journal, Vol. IV. p. 285.



symptoms occurred which were observed by Mr. Maunoir. Though, therefore, I would not apprehend the accession of such violent inflammatory symptoms, from making the incision too large, the bad effects by which it might be accompanied, in retarding the ready reunion of the wound, ought certainly to be kept in view.

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The first *five* figures of the plate are to be considered as mere plans, explanatory of the mode in which the incision of the cornea is to be made; other three figures are added (Figs. 6, 7, 8), which are accurate outlines, taken from patients on whom I had performed the operation. In Fig. 6, the operation was done on the right eye; and although the line of the incision appears strongly marked in the drawing, yet it could only be perceived in the eye itself by making the patient look upwards. Fig. 7th much resembles the former, and was taken from the left eye of another patient. In Fig. 8, the incision more resembles that given in the plans, but, it may be observed, it is too close to the edge of the pupil. This arose from a difficulty which took place during the operation; for after I had penetrated both sides of the cornea, a very unusual and remarkably strong contraction of the muscles of the globe of the eye took place,

which required a continued force to overcome, so that the incision was compleated with difficulty, and not in such a manner as could have been wished: even in this case, however, the pupil remained of a full size, and in the centre of the eye-ball.









