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COMMUNICATIONS

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EXPERIENCE GAINED FROM ONE HUNDRED AND  
FORTY TREPHINE OPERATIONS FOR GLAUCOMA\*

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It may be thought that the subject of operative treatment for glaucoma has been sufficiently thrashed out, and that very little more can be said about it. With this opinion I do not agree. Glaucoma is so serious a condition, especially the chronic type which shows so many variations in the symptoms and signs, that the question of operative interference merits all the discussion we can put into it from every point of view. Many contributions have recently appeared in favour of iris-inclusion and silk-inclusion operations rather to the detriment of the iris-free operations, with very little in defence of the latter method from those who are in the habit of frequently performing the trephine operation; while those on late infection have, to my personal knowledge, deterred many surgeons from advocating trephining with any degree of confidence, and have indeed led some to give it up altogether. In perforating wounds of the eye, and after cataract extractions, it is the aim of surgeons to avoid permanent inclusion of the iris in the wound owing to the danger which we have always been taught to believe by pathologists is associated with such inclusion; and I

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fail to follow the arguments by which it is sought to justify it in operations for glaucoma, even though some of them have turned out satisfactorily, unless, of course, all other methods have proved unsuccessful.

No doubt it is a dangerous practice to leave an opening in the eye only separated from the external air by a relatively thin layer of conjunctiva, but this applies to all filtering scars, however they are made, and the only question to decide is which is the least dangerous.

The difficulty of suddenly upholding a particular type of operation as opposed to another is that one is not at the moment prepared with all the necessary data on which an opinion, to be of any value, must always depend, and this fact stifles discussion. In a subject like glaucoma we cannot be too careful in collecting all the available evidence in order to enable us to decide on the best type of operation.

During the last nine years I have performed 140 trephine operations, of which 29 were private cases and the rest hospital ones; and although this represents nothing exceptional compared with those performed by many other surgeons, I presume that my colleagues at Moorfields have probably done a corresponding number, and if all their experience were added to mine, I feel sure there would be an overwhelming amount of evidence in favour of the trephine operation. At any rate, late infection is extremely rare at Moorfields, and I believe its occurrence is much exaggerated.

Very possibly I have nothing very new to say on this subject, but I have thought the experience I have gained might be useful to others, and anyhow, may prove a basis for discussion, as I am aware that my views do not entirely coincide with those of others.

I have not escaped any of the complications which appear to have happened to others. I have lost the disc and found it again in the anterior chamber when I succeeded in getting it out; I have lost it and never seen it again anywhere; I have done complete iridectomies by mistake and also on purpose; I have experienced delay in re-formation of the anterior chamber, and in one case it has never formed at all; and I have also lost vitreous on one or two occasions.

The technique I have learnt to adopt is as follows:—I have reasons for believing that to avoid late infection the importance of an efficient conjunctival flap cannot be over-estimated; and I therefore endeavour to make it as thick as possible and take every precaution I can think of to prevent tearing or buttonholing the conjunctiva at every stage of the operation. To this end I strip the conjunctiva off the globe in its entire thickness right down to the sclera from the very beginning, and continue cutting with scissors, keeping the points directed towards the globe. I never

use toothed forceps for holding the flap for fear of tearing it, except for the initial fixation, and afterwards replace them with the finest pair of forceps without teeth, holding the flap horizontally and pulling it downwards over the cornea. As soon as, or almost before, the limbus is reached I use the secondary cataract knife and keep it directed towards the globe, pressing slightly all the time. In this way I strip up the superficial layers of the cornea, keeping well in the sulcus formed by the reflected flap, and aim at getting as far forward as possible. I never find that I get too far forwards, as my experience is that one is always further back at the end of the operation than one expects to be. In applying the trephine, I place it on the sclera and slide it downwards until it is in contact with the flap, but before commencing any rotatory movements I draw the flap upwards and backwards so that it is parallel to and along side of the trephine; this is to avoid buttonholing the conjunctiva. If such an accident happens at this stage without noticing it, the hole in the conjunctiva will not be seen until after trephining is completed, when the only thing to be done is to make a new conjunctival flap from one side or the other and draw it forwards over the cornea; otherwise the hole will certainly remain uncovered. While rotating the trephine I always direct the handle forwards so as to cut through the anterior part of the scleral disc before the posterior, thus ensuring the formation of a hinge posteriorly when the section is complete; in this way the removal of the disc can be accomplished later without any fear of injuring the conjunctival flap. Having once got the trephine to bite, I never remove it until the section is finished, so that the full force of the aqueous discharge will push the knuckle of iris well out of the wound. If the trephine is continually taken off, the sclera may be only partially cut through in several places, and the aqueous drains away slowly, not suddenly; in which case the iris may not prolapse at all or only very slightly, making it difficult or even impossible to remove any iris at all. The guide to the penetration of the sclera is the pupil coming up towards the hole. As soon as the iris presents it must be dealt with at once, and the disc may be left to take care of itself, attached as it is to a hinge posteriorly; any manipulation with the disc only leads to discharge of the aqueous and the iris slips back. I grasp the iris with very fine straight forceps, containing one tooth only, at the posterior part, at the same time pulling downwards and forwards in order to detach it from its root; this, I think, can be done better with straight forceps than with ordinary iris forceps, because owing to the curved shape of the latter the disc may be caught up at the same time as the iris, and the iris cannot then be pulled out quite far enough owing to the attachment of the disc, which limits the distance one is able to pull. I

believe Colonel Elliot advocates this method with his special forceps made for the purpose, but it seems to me that, in order to sever the two together, ordinary scissors must be used which may not make such a clean cut in the iris, and strands are left which may be difficult to replace and almost as difficult to remove. Lastly, I cut off the disc which can now be easily done without endangering the conjunctiva. Any layers of sclera left from an incomplete trephine section can be removed by pulling them up with a sharp hook and cutting them off with scissors; but I think this is unlikely to happen if the trephine is used in the way I have stated above. I generally put one or two stitches in the conjunctival flap, and I am beginning to think for some reasons it might be wise to put in more.

#### COMPLICATIONS.

*Buttonholing the flap.*—The flap must always be closely watched, and if any hole is seen, a new place must be selected for applying the trephine. I seldom use a repositor to see how far forwards I have stripped up the corneal layers in case the patient should roll his eye up, when the repositor may perforate the conjunctiva.

*Loss of the disc.*—This has happened to me three or four times. It may be drawn into the anterior chamber, it may be left in the trephine, or it may be washed away when the aqueous is discharged. Once I got it out of the anterior chamber with a repositor, but in the other case I never saw it again, and I do not think it matters much where it is so far as the prognosis is concerned.

*Complete Iridectomy.*—Sometimes the iris is so dilated at the time of the operation that the force of the aqueous discharge causes a total prolapse up to the pupillary border. Under these circumstances the whole of the prolapsed portion must be cut off and a complete iridectomy performed. I am sure it is unwise to do a buttonhole iridectomy and then try to replace the remainder of the iris through the trephine hole with a repositor; it only gets torn and tags may be left and become adherent to the hole.

Sometimes a complete iridectomy occurs through too free a division; it is only necessary to grasp the iris with a pair of single toothed forceps as high up as possible, and the scissors placed immediately below the end of the forceps. If a complete iridectomy is intentionally made, the iris must be pulled well out of the wound as in doing an ordinary glaucoma iridectomy.

I never like finding out that I have done a complete iridectomy by mistake, which has happened to me three or four times, because I think in this case the root of the iris has probably been left behind,

which, by adhering to the posterior part of the trephine hole, encourages at any rate partial healing; and my impression derived from the few cases where this has happened to me tends to support this view.

*Vitreous Loss.*—Apart from cases of buphthalmos, where this accident is not uncommon, vitreous loss has occurred in my cases about three or four times. It may not influence the ultimate draining capacities of the trephine hole, though I always expect it to do so; but no doubt it largely depends upon whether the vitreous is solid or liquid. In two cases of my own there was good drainage and the vision afterwards was not affected. In one case the vision was 6/6 and has remained so ever since.

*Delay in re-formation of the anterior chamber.*—This has occurred in about half a dozen of my cases, and I used to regard it as a reason for keeping patients longer in bed than usual, but I have modified my views in this respect and allow them to get up at the ordinary time, when I have frequently found that the anterior chamber forms immediately. It has been stated that the cause of the delay is that aqueous drains away beneath the conjunctival flap. I think this is quite possible and is a reason for more careful stitching of the conjunctiva, but this cannot account for all cases, otherwise the anterior chamber would not be likely to re-form so quickly after getting up. At the same time, I am apprehensive, when the formation of the anterior chamber is delayed too long, lest there be adhesion of the iris to the trephine hole, especially as there is nearly always a little inflammatory reaction in the iris after the operation; and for this reason I always use atropin as a routine treatment.

*Lens comes forwards and sometimes becomes opaque.*—This has occurred at the most in two or three of my cases, but in only one case could I be sure that there were no opacities before. I have thought that if lens opacities existed before the operation they might progress more rapidly afterwards.

I cannot quite explain these cases, but I think it is quite impossible to trephine on to and open the capsule of the lens, as has been suggested by some surgeons.

*Detachment of the Choroid.*—This has not, to my knowledge, happened very often in my cases, though I have looked for it; at the same time I think it may occur without being always recognized. I have not come across any serious complications arising from this accident though it may be responsible for failure in the re-formation of the anterior chamber, and I am inclined to think that it seldom makes much difference as the choroid generally becomes replaced.

*Late Infection.*—With regard to late infection, the first point to decide is what are we to describe as cases of this nature. Since

the presence of a permanent opening in the eyeball constitutes the weak point in the operation, entrance of organisms must be looked for through this channel to justify the term "late infection," and it seems to me that any inflammatory reaction must be associated with weakness or rupture of the conjunctival flap.

Inflammations which occur within the first few weeks of the operation one may reasonably ascribe to direct infection through the scleral and conjunctival wound, but those taking place many years afterwards in the presence of a thick firmly attached flap with good drainage I certainly do not place under the heading of late infection. I see no reason for assuming that every type of inflammation occurring in an eye after a trephine operation should be regarded as the direct result of the operation.

*Results.*—On looking through my records, nothing impresses me so much as the fact that cases I was able to secure early gave by far the best results, especially when I was able to perform the operation at a time when the tension was normal, and I only trephine in acute glaucoma if I have been successful in reducing the tension before the operation; otherwise I now do an iridectomy.

When I have once satisfied myself of the existence of glaucoma by catching a patient in a subacute attack, in spite of the fact that on recovery the vision is 6/6 and the field is full; or by the presence of the ordinary signs and symptoms associated with glaucoma, I always advise an operation, and I have had some of my greatest successes in cases of this kind. I have seen two eyes side by side in the same patient where one has been trephined in an early stage, but where the operation for some reason had to be postponed in the other, and the unoperated on eye steadily went downhill with the same symptoms; but after operation the symptoms were cut short and controlled, as happened in the first case. My private cases have been relatively far more successful than the hospital ones, and this I attribute to the fact that we are more likely to secure the patients in the initial stages because they are more observant of early symptoms, besides those cases which are discovered accidentally in the routine examination for refractive errors.

So far as I have been able to follow my cases, my greatest failures, of which I have had about 13 altogether, have been in those where the tension was raised at the time of the operation, when the history has been of long, often several years, duration, and when the field has been *generally* contracted almost down to the fixation point; also in secondary glaucoma, in buphthalmos, or in any cases complicated by previous accident or changes in the fundus. I reckon as failures those cases where the vision had fallen to finger counting or hand movements with much contraction of the visual field, and where no improvement followed the operation

even though the little vision they had was preserved; or where the subjective symptoms have continued either with or without draining of the trephine hole. Also I have included the cases where vision has become in any way worse after the operation; such as fairly good distant vision (e.g., 6/18 or 6/24), but where there has been difficulty in reading.

I do not count those cases which, although not definitely improved, still retain a useful standard of vision (say 6/18 or 6/24) both before and after the operation.

Many cases, so far as vision is concerned, appear worse immediately after the operation but show improvement later on, and I have had some striking examples of this kind, but some, especially the bad ones, never return for examination.

I have seldom had good results in cases of acute glaucoma or secondary glaucoma; there is too much congestion round the limbus in both instances and this encourages healing of the trephine hole; and, moreover, in acute glaucoma, the conjunctiva is often so friable that there is danger of the flap giving way both during the operation and afterwards.

I have had one case of suppuration six months after the operation, and this was due to a weak conjunctival flap which I noticed at the time, and I was therefore forced to draw over a new piece of conjunctiva which, however, evidently did not give sufficient protection. Another of my cases was staying at Bournemouth four years after I operated on her, and came under the care of Mr. Maddox, from whom I gathered that the eye was nearly lost from suppuration accompanied by acute conjunctivitis, but she completely recovered under his treatment. On her return it seemed to me that it might have been a case of iridocyclitis rather than suppuration, as I noticed several spots of "k.p." and some vitreous opacities; but at the same time the conjunctiva immediately covering the trephine hole was excessively thin.

Two cases of cyclitis have occurred, one in private four years after the original operation, and one in hospital, both of whom recovered. I have never had a case of sympathetic following trephining. I always advise regular massage to the eyeball once or twice a day, unless the tension is on the soft side, or the conjunctival covering appears thin; and the slightest suspicion of rise of tension, mists, and haloes, can be completely controlled in this way.

I have, therefore, no hesitation in saying that, from my own experience, I have formed the opinion that the operation of trephining, performed with every consideration for the conjunctival flap, is the ideal one for chronic glaucoma, especially for that type occasionally met with in young adults, and the earlier the operation is undertaken the better.