

In concluding these remarks, I would ask—How are the conflicting statements of those who advocate, and of those who denounce the use of mercury in syphilis to be accounted for? unless we admit that this medicine may be either useful or injurious according to the manner in which it is used. And again—Why has the external use of mercury been advocated by the most practical and able surgeons as the safest and surest method of treating syphilis in preference to the easier and readier method of internal administration? unless that it was found by experience that the symptoms yielded more completely and satisfactorily, while the general health remained unaffected by the remedy, when employed in this manner. The *gentle and gradual* action of mercury was thus gained; while its energetic and poisonous effects were avoided.

ART. XIII.—*On Extraction of Cataract by von Graefe's Peripheral Linear Section.* By HENRY WILSON, F.R.C.S., M.R.I.A.; Assistant Surgeon to St. Mark's Ophthalmic Hospital; late Teacher of Ophthalmoscopy at the Richmond Hospital, &c., &c.

THE subject of cataract has attracted a very large amount of attention from the earliest times, and if we consider how frequently this disease is the cause of blindness, and reflect on the difficulties encountered in its removal, we need not wonder at the very great interest attaching to it; nor at the largely increased amount of consideration and research devoted of late years to the means of its cure. Notwithstanding the ignorance or uncertainty of the ancients as to the true nature and seat of the disease, as is amply testified to both by their writings and nomenclature, many valuable instruments and operations were devised by them for its cure, some of which are retained even still. The needle was employed probably before the Christian era, and in its various modified forms still holds its ground, and is largely made use of; so long ago as the eighth or ninth century a hollow needle for the removal of cataract by suction was in use in Persia, and has been described and figured by Jesu Hali (Isa Ben Ali), a Christian oculist of great repute, living in Bagdad, in the ninth century.

Although we can thus trace back the needle to remote antiquity, the period when the knife, and with it the operation of extraction, was first employed is involved in obscurity. A passage in Pliny

has long led to the belief that extraction was practised in or before his time. The learned Professor Hirsch, of Berlin, has, however, lately brought his profound medico-philological knowledge to bear on the matter, and has given the weight of his authority against this supposition. He adduces evidence to prove that the word *squama* made use of by Pliny does not denote cataract at all, but corresponds to the Greek *λεπίς*, a scale or splinter. A passage from Rhazes (Abu Bekr El-Razi), the Arab Galen of his time (ninth century), has been largely quoted to show that Latyrion, a name which is known only through this one passage, practised extraction. Dr. Hirsch is of opinion that this text does not bear the meaning thus attached to it, and says the assertions made of late years respecting the claims of Latyrion and Antyllus to this operation rest on gratuitous assumption, and copying erroneous quotations without reference to the original. He also remarks that the term *cataract* does not belong to remote antiquity, but that the first mention of it he has found occurs in Platearius a physician living in the twelfth or thirteenth century. Probably one of the first authentic records of extraction is that alluded to by Himly when he mentions that Freytag a surgeon in Zurich removed the cataract through a corneal flap wound in 1694; but so far as I can learn extraction was not practised until the beginning of the last century when the accidental dislocation of the cataract during or after the operation of couching, then much in vogue, necessitated its removal through a corneal incision. Petit, St. Yves and Daviel contributed each their share in bringing the operation of extraction into general use, but to Daviel in particular belongs the merit of devising and perfecting the operation of which he published an account in 1747. Brisseau's previous discoveries or rather demonstrations respecting the position and nature of cataract contributed no doubt largely to the adoption and progress of the new operation. In 1650 Reni Lasnier, a Paris surgeon, maintained that cataract resided in the crystalline lens, and in 1705 Brisseau demonstrated that such was absolutely the case. In the *Philosophical Transactions* for 1724-25, John Ranby the favourite surgeon of King George the Second records the dissection of two cataractous eyes which showed that the lens was the seat of the cataract. In the same volume is contained a Latin communication respecting the eyes of a soldier, who died in the Royal Hospital, Kilmainham, nine years after having been couched in both eyes by Caywood, a Dublin oculist; the eyes were examined by Professor, afterwards Sir Thomas

Molyneux, and no trace of the lens was to be found in either eye. In 1750 O'Halloran one of the most eminent surgeons of his day and practising in Limerick, published a treatise on the cataract prefaced by the significant sentence from Seneca, *vanities temporis quib; una quæ nunc latens in visum cito exoritur*; in this philosophical essay the author shows the cataract to be in the lens. O'Halloran was amongst the first British surgeons to extract the cataract as is shown by his essay in the second volume of the *Transactions of the Royal Irish Academy* published in 1788; he advocated a corneo-sclerotic incision ~~comparable to that of von Graefe to which~~ I have to refer, and suggested also the removal of the cataract in its capsule. Some of the earliest writings in the English language on the extraction of cataract are those afforded by Warner 1776; Chandler, Buttery &c. This operation has gradually been perfected and has now, I rejoice to say, superseded in all civilized countries the dangerous and reprehensible practice of couching or reclinatio—dangerous because even if temporarily successful the depressed lens having been forced through and broken up the vitreous humour and hyaloid membrane is placed lying in the bottom of the eye in contact with the retina and pressing upon it, the choroid and ciliary body; in this new position it acts as a foreign body giving rise constantly to a slow insidious form of inflammation or even panophthalmitis, which destroys not only the sight of the operated eye, but also frequently that of the second eye through sympathetic extension of the irritation. Couching cannot be too strongly or too loudly condemned, and if mentioned at all in writing or teaching it should be alluded to solely as a matter of past history.

The operation of extraction has undergone various modifications and improvements; some authorities, such as O'Halloran, Buttery, Earle, Benjamin Bell, as well as continental authorities recommending the sclerotic or the corneo-sclerotic junction as the best place for the incision, the majority of operators advising the cut to be made entirely in the transparent cornea; some made the section above, others below and again others at the side of the globe. Most operators made a large incision, some such as Wardrop, Travers, and Adams made a small section, Wardrop recommending an opening one-quarter the periphery of the cornea. The operation for the removal of senile hard cataract as eventually practised, and which held undisputed sway amongst scientific men down to a few years ago, is known as the flap extraction, and is performed by making an opening in the transparent cornea to the extent of one-

half of its circumference, opening the capsule of the lens and expressing the cataract through the pupil and through the corneal opening. In cases of soft cataract in juvenile persons, Mr. Gibson of Manchester first broke up the lens with a needle, and after some time made a small straight or linear incision in the cornea through which he removed the broken up lens with a curette. Mr. Walker, also of Manchester, devised the grooved needle-knife here figured,

Fig. 1.



and which was originally described by Sir Wm. Wilde in this journal and by him introduced into practice. In recent traumatic cataracts the lens is quite soft and will readily flow out through the groove when the instrument is pushed through the cornea into the lens.

Flap extraction is amongst the most beautiful of operations, and yields when successful the most perfect results both as regard vision and appearances; cases occur in which it is difficult to recognize any traces of an operation; it requires however great steadiness and quiescence on the part of the patient, and it demands on the part of the operator considerable manual dexterity (only to be acquired by practice), keen vision, calmness and control of temper, and patience which the most untoward events will not ruffle or exhaust; a correct judgment and promptitude in action which will enable him to encounter successfully the various casualties which are likely to occur; he should possess moreover an extended knowledge of human character in general and of his patient in particular; and in addition to this list of personal qualifications he must be provided with an experienced assistant who should act with him in unison of mind and body, who should in fact be to him a third hand. By constant practice and long experience an operator may acquire such expertness that the operation becomes in his hands almost a certainty; but no dexterity and no experience can avert the sometimes disastrous consequences of the operation; the real dangers commence only after the completion of this operation, then ensue the long and weary days and nights of careful watching, and of alternating hopes and fears, a most anxious time for both patient and attendant, as I well know from my past experience. I will now very briefly refer to some of the chief difficulties and dangers during and after flap extractions, in even the most skilful hands.

There are certain measurements and indications laid down for the extent and position of the incision in the cornea, but it is found impracticable, except under chloroform and with fixation of the globe to make a perfect section in every case, it may result too small or too large, its position may be faulty or it may have to be completed or enlarged with the scissors or knife; the iris may be cut, vitreous may be lost, hemorrhage may occur; I have even seen the whole contents of the eye, iris, lens, vitreous, retina, and choroid projected through the wound. In order to express the cataract in the normal extraction the lens must be rotated to a great extent in its axis and pressed through the pupil; now by these acts considerable pressure must of necessity be exerted by the lens on the iris and vitreous humour, and in consequence of this bruising of the iris inflammatory changes are very apt to occur in that structure. In cataracts with soft periphery the soft matter is very likely to be scraped off and to remain behind the iris where it gives rise to iritic complication and neoplastic formations in the pupil. In some instances the vitreous is perfectly fluid, and the lens when freed from its capsule falls down into the bottom of the eye, from whence it is sometimes almost impossible to remove it. Another great difficulty in flap extraction is presented by adhesions of the iris to the lens. Of course unsteadiness on the patient's part and spasm of the ocular muscles will greatly complicate the difficulties of the operation. I have more than once seen the operation attempted and postponed to another day in hopes of the patient becoming more quiescent. The principal dangers which retard or prevent the successful recovery are non-union or reopening of the wound generally with and rarely without prolapsus of the iris, ulceration or sloughing of the edges of the wound, suppuration of the cornea, iritis, chorio-iritis, panophthalmitis; hemorrhage is of very rare occurrence after flap extraction, it does however sometimes occur, and if to any great extent results in loss of vision. It is but natural to suppose that a wound of such magnitude cannot be made with impunity in a non-vascular structure, like the cornea in persons advanced in life; owing to the great extent of the cut the cornea is peculiarly liable to destructive changes. It is a matter of great importance that the surface and edges of the wound should be in perfect apposition and heal by primary intention; practically it is found very difficult to keep the opposed lips of the wound in perfect co-action; hence Dr. Williams, of Boston, has recently recommended the wound to be united by sutures; he states he has

obtained most satisfactory results from this practice. Suppuration of the eyeball commencing either in the cornea or in the uveal tract is of all the sequences the most fatal to the eye; and occurs even under the most favourable circumstances in about 7 per cent.; iritic complications are of very constant occurrence and result in complete or partial closure of the pupil as also in neoplastic formations in it requiring secondary operations; non-union or reopening of the wound with prolapse of the iris retards the recovery very much and results in distorted pupil and large cicatrix of wound. Loss of vitreous during flap extraction results generally though not invariably in a broad and extensive corneal cicatrix and horse-shoe shaped pupil. Secondary hemorrhage, vomiting and diarrhea are amongst the rare sequences. Although flap extraction yields when successful as I have stated the most perfect results, results such as no other operation has attained, yet the dangerous sequences are so great and so many, that operators have been induced to seek for some more safe method of removing the cataract. About the year 1861 von Graefe, of Berlin, occasionally performed an iridectomy in cases where there had been any difficulty in expressing the lens or in which he had reason to anticipate an unfavourable recovery. A couple of years subsequently one of von Graefe's assistants, Dr. Schufft, now named Waldau, removed the lens by means of a spoon-like instrument through a comparatively small straight incision in the transparent cornea. It is right to mention, however, inasmuch as the spoon has become a generally adopted instrument that von Graefe claims having made use of such an instrument long before Waldau, and states correctly that after all the spoon is merely a modification of Daviel's instrument so long and still in use. Figs. 6 and 7 on plate 8 of Scultet's *l'Arcenal de Chirurgie*, 1675, might almost be taken as the prototype of the curette and spoon. The idea of removing the lens by an instrument introduced through the pupil to the back of the lens is not new, for Bell in his *System of Surgery*, 1786, recommends a hook for that purpose. Butter made an incision into the sclerotic with an instrument which opened forceps-like, seized and withdrew the cataract. To avoid bruising the iris and to avert subsequent inflammation as well as to facilitate the exit of the lens iridectomy afterwards became a feature of Waldau's scoop operation; the spoon underwent various modifications and improvements, Mr. Bowman's being I think the best, and eventually an operation known as the traction extraction of Bowman and Critchett came into general use. This operation

consists in making a straight incision into the transparent cornea immediately at its junction with the sclerotic, or better into the corneo-sclerotic junction itself, excising a segment of the iris, opening the capsule and then introducing the spoon between the lens and the vitreous and lifting out the cataract in it; the cut is made at the upper part of the globe by means of a triangular spear-shaped Jaeger's knife, bent on the flat and embraces nearly one-third of the corneal circumference. In consequence of the cut being made superiorly, the iridectomy, which is a necessary portion of the operation, is concealed by the upper lid—indeed as a rule I invariably perform iridectomy when undertaken for the relief or cure of glaucoma or in cataract operations at the upper portion of the iris, because the upper eyelid not only conceals the coloboma which might be considered unsightly, but also because it cuts off the peripheral rays of light which might prove dazzling and troublesome. Although some of my most successful cases eventuated from traction extraction I have discontinued the operation as it did not yield me the satisfactory results I had anticipated; I have had suppuration after it both in private and in hospital practice. I may mention incidentally that in one of these cases of suppuration which occurred in my practice at the Richmond Hospital I subsequently removed the cataract from the second eye by the old flap extraction with the most satisfactory termination. I regard the introduction of traction instruments behind the lens as a dangerous procedure more especially in elderly persons with weak fatty heart; such persons are indeed I think peculiarly liable to suppurative inflammation after any extraction. Iridectomy has now become an almost indispensable feature of extraction no matter by what method; Mooren of Düsseldorf was in the habit of performing iridectomy some weeks prior to the flap extraction, but notwithstanding the very satisfactory results he obtained (only 14 losses out of 229 extractions), he has now abandoned his method for that of von Graefe. Removal of the lens in its capsule which I have referred to was practised, occasionally by Beer, Richter, and some of their pupils; Dr. Pagenstecher, of Wiesbaden, who has revived this procedure makes an iridectomy downwards. Jacobson executed a flap extraction with iridectomy following the expulsion of the lens—a proceeding I witnessed occasionally in von Graefe's clinique several years ago. Professor Macnamara, of Calcutta, after dilating the pupil with atropine and chloroforming the patient makes a straight incision in the temporal

side of the transparent cornea to the extent of half an inch, and while withdrawing the knife opens with its point the capsule of the lens; he then introduces a fenestrated spoon by which pressure is made on the edge of the lens, which causes the latter to tilt over in its axis and to lie in the scoop. I have not performed this operation, which appears to me very similar to Schuett's original scoop extraction, but I should fancy that the loss of aqueous humour and the irritation of the operation would tend in a large number of cases to contract the pupil, and that there must of necessity be a good deal of bruising during the manipulations; the professor states, however, that he obtains perfect results where the flap extraction utterly failed. I now come to the latest modification of extraction from which I have been led into this long digression by the great interest attaching to the history and literature of extraction in general.

This modification, which is known as von Graefe's extraction by peripheral linear section, or modified linear extraction has been adopted by many operators, and as it appears to answer the requisite purposes, and seems to me to afford a safer means of removing cataract than the flap extraction, I would wish to bring it under the notice of the members of the Irish profession, who may have few opportunities in country districts, and little leisure for consulting special works and periodicals. It is due to Dr. Taylor, of Nottingham, to mention here that quite independently of von Graefe he adopted in isolated cases a section almost identical with that I am about to describe. Dr. Taylor performed prior to the section what seems to me a very small and incomplete iridectomy, as he made it through such a small incision in the cornea as was "just large enough to admit a small blunt hook." His notice is contained in the April number for 1866, of the *Ophthalmic Review*, a publication which has I regret to say ceased to exist.

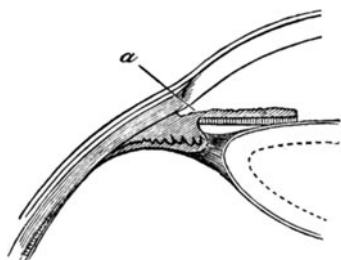
Von Graefe endeavours to avoid the principal dangers of flap extraction, by making the section as small as possible compatible with the exit of the lens, in such a structure as is least liable to suppurative inflammation, and in such a position and manner as will allow of the most facile delivery of the lens and of the most perfect coaption of the surfaces of the wound, as well as by adopting such precautionary measures as are likely to guard against subsequent destructive inflammation. These objects he attains, I conceive, by executing a small nearly straight section in the sclerotic border, and corneosclerotic junction, nearly opposite the

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margin of the lens, by making a conjunctival flap which shall cover the wound, and by performing an iridectomy.

The accompanying cut copied from von Graefe's essay in the

Fig. 2.



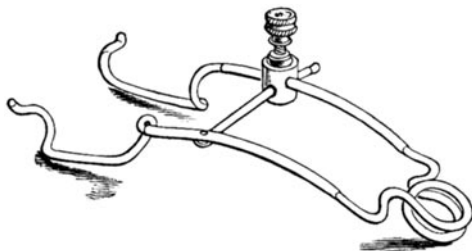
Archiv für Ophthalmologie for 1865, illustrates the relative position of the parts, the line *a* representing the incision. It is well known that wounds in the sclerotic and corneo-sclerotic junction are less liable to suppurative inflammation, and that they heal more readily than those in the transparent cornea; the external wound measures $4\frac{1}{2}'''$ — $5'''$ and the internal one $4\frac{1}{2}'''$, the height of the flap does not exceed $\frac{1}{4}'''$ whereas it measured $2'''$ — $2\frac{1}{2}'''$ in the old flap extraction. The wound in von Graefe's operation, though strictly not a linear one, may for all practical purposes be regarded as such; its surfaces lie in exact apposition, it is covered over by the conjunctiva, and is in every respect in the most favourable position for immediate union. By a reference to the illustration it will be seen that the opening is as nearly opposite the margin of the lens as is possible without interfering with the ciliary body and processes. The manifest advantage of this position as regards the delivery of the lens, is that when the iris is removed, the capsule opened and pressure made at the opposite side of the globe, the lens glides easily and naturally into and through the wound; the disadvantage is that the internal corneal margin being cut across the zonula is thereby deprived of its support, and there arises a tendency towards escape of vitreous, a circumstance which has occurred in about twenty-five per cent. of the cases I have operated on.

The operation is performed as follows:—The patient is placed in the recumbent position, on a couch or bed opposite a good light, the eye not to be operated on is covered or bandaged

* The foot is expressed by ('), the inch by ("), and the line by (''').

down, the eyelids separated by the spring speculum here figured and the globe drawn downwards by a toothed forceps applied

Fig. 3.



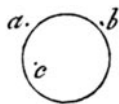
immediately below the inferior margin of the cornea; in fixing the eyeball a broad fold including the sub-conjunctival cellular tissue and even the insertion of the inferior rectus if feasible should be grasped between the blades of the forceps, for the conjunctiva alone affords often but a slight hold and is liable to be torn through. In fixing the globe it should be rotated directly downwards, otherwise the section and consequently the iridectomy will fall towards one side and the resulting coloboma will be exposed to view and appear unsightly as well as give rise possibly to disturbing dazzling. When the operator has thus steadied the eyeball he holds the knife here figured in his other hand, its flat surface parallel to the plane of the iris, its cutting edge directed upwards

Fig. 4.



and inwards, and inserts its point into the sclerotic $\frac{1}{2}$ ''' from the corneal margin at *b*, Fig. 5, copied from v. Graefe, which represents

Fig. 5.



the left eye, and pushes the instrument obliquely downwards and inwards into the periphery of the anterior chamber towards *c*, in order to secure a large internal wound. When the knife has entered the chamber in this direction, to the extent of 3''' or 3½''' its handle is depressed and the point thus elevated is directed

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towards the counter puncture *a*, and pushed onwards beneath the opaque cornea into and through the sclerotic border. When the point of the knife has penetrated the sclerotic and appears either underneath or outside the conjunctiva, the cutting edge of the instrument should be turned very slightly forwards, and the section completed in the corneo-sclerotic junction, either by a sawing motion or an onward thrust. The blade of the knife then lies free immediately underneath the conjunctiva, and should be still further rotated with its cutting edge forwards or even forwards and downwards and the conjunctiva divided in this direction. By this means a conjunctival flap of not too large dimensions is formed which subsequently covers the wound. In making this section the knife should be entered at the extreme periphery of the anterior chamber, and should leave it in a similar position; care must however be taken not to introduce the knife too far downwards and inwards into the chamber before reaching the counter-puncturation and not to direct the point of the knife too far backwards, otherwise a large gaping wound will be made in the sclerotic implicating the ciliary body and exposing the vitreous humour; neither should the counter-puncture be in the transparent cornea; if a faulty puncture or counter-puncture be made the point of the knife should be withdrawn and inserted in the desired position. The outer wound is almost altogether in the true sclerotic tissue while the inner is in the corneo-sclerotic junction. It happens sometimes that the point of the knife after dividing the sclerotic pushes the conjunctiva before it instead of piercing it and the aqueous humour escapes into the bag of the conjunctiva; this circumstance should not alarm us, nor prevent the section being quietly completed, but when the knife has been cut out the conjunctival opening should be enlarged with a scissors down to the point of counter-puncturation. With the completion of the section terminates the first step of the operation; the forceps is then given to the assistant who draws down the globe and the operator turns the conjunctival flap back over the cornea. The prolapsing iris being thus fully exposed is seized in the iridectomy forceps near one angle of the wound drawn but very slightly forwards and cut through with a straight or angular scissors as close as possible to the corner of the wound; its ciliary attachment is then freed by a touch of the scissors or torn through by drawing the forceps with the iris in it to the opposite angle, where it should be divided also as close as possible to the corner of the wound. In quiescent patients with moderately

prominent eyes I sometimes make the iridectomy without having the globe fixed. It is very important to remove the iris up to its ciliary attachment as completely as possible, especially at the angles, for otherwise it is very likely to prolapse, retard the healing of the wound, and give rise subsequently to a cystoid cicatrix, which is peculiarly liable to become irritable. It requires some little care also to avoid cutting the conjunctiva with the scissors; it should therefore be carefully turned down over the cornea before the iridectomy. On completion of this second step the globe is released by the assistant, and if there be no complication the third step that of opening the capsule is to be forthwith proceeded with. If there be hemorrhage into the anterior chamber from the iris or conjunctiva it should be removed before lacerating the capsule, gentle upward movements of a spoon or curette over the front of the cornea and slightly opening the wound will generally suffice to remove the blood. The laceration of the capsule seems to me the most difficult part of the whole operation and requires considerable dexterity and judgment. The operator fixes the eye, introduces the cystotome on the flat as far as the inferior border of the pupil where he gives the instrument a half turn, whereby its cutting sickle-shaped edge comes into contact with the convexity of the lens, and in this position he draws the instrument upwards and thus opens the capsule; it is well to make two cuts starting from one and the same point inferiorly—the one directed upwards and inwards, the other upwards and outwards; an incision along the periphery corresponding to the section is also advisable. In this manipulation great care is to be taken not to displace the lens—a thing difficult to avoid in old cataracts with tough degenerated capsules. If the lens be accidentally disturbed it should be replaced *in situ* by a hook or curette, otherwise its faulty presentation to the inner wound will cause difficulty in its delivery. If there be adhesions of the iris to the lens they should be divided with the cystotome. The fourth and last step consists in the expulsion of the cataract; the fixation forceps is shifted to one side of its former position, the convex smooth surface of a caoutchouc or tortoise-shell spoon which will not injure the corneal epithelium is placed on the lowest part of the cornea and pressed against it in a backward and upward direction; this pressure causes the lens to start and should be continued steadily backwards until the lens is fairly in the wound, when the pressure should be directed upwards by gliding the spoon along the cornea, following the movements of

the lens until the whole cataract has been expelled; should portions of the soft cortex be stripped off and remain in the pupil they are to be pressed out by the action of the spoon on the cornea and by opening the wound. If there be any difficulty in expressing the lens the posterior lip of the wound may be slightly depressed while the pressure is continued below—an assistant fixing the eye; it is advisable at this stage of the operation however if fixation be necessary for the operator to control it himself, as improper pressure might easily cause loss of vitreous. In the majority of cases of ordinary cataracts this pressure properly directed will suffice to express the lens; in some instances however notably where there has been much loss of vitreous or where the vitreous is fluid it fails, and we must then have recourse to traction instruments, such as hooks or spoons; v. Graefe's hook bent in the stem so as to adapt itself to the convex posterior surface of the lens is introduced on the flat, given a half turn and inserted into or beneath the lens and the latter withdrawn, or a spoon is made use of as in the traction extraction. Where the vitreous is known to be fluid we should remove the lens with the hook without having recourse to pressure. Before bandaging the eye we should satisfy ourselves as fully as possible by testing the vision and otherwise that all portions of the lens have been removed: after taking the speculum away and allowing some time to elapse we should gently rub the upper lid over the globe by which means often small particles which had previously remained concealed behind the iris will come into view; these as well as pieces of capsule should be carefully removed as they are, if left behind, most likely to cause iritic complications and neoplastic formations; the time thus spent no matter how long should not be grudged or considered illspent, for on the *complete* removal of the lens depends in a great measure the ultimate success. I am in the habit of testing the vision at this stage; in the ordinary cases where a cataract has been perfectly removed the patient should recognize and distinguish faces. All filaments of blood and particles of lens are to be removed from the wound by means of a curette. In one instance of normal operation in which vision was as perfect as possible under the circumstances a small clot of blood remained at the inner angle of the wound, and with a view of removing it I seized it with the iridectomy forceps as I had often done previously; at the very moment however the patient made a sudden movement with her head and I saw the iris stretching and, before I had time to open the forceps, the ciliary attachment at its

lower and inner side gave way and blood poured forth which quickly filled the anterior chamber; the reason of this was the fact that I had unawares seized in the forceps a piece of prolapsing iris which had been concealed by the clot of blood. I may mention that notwithstanding this serious and avoidable accident the patient after some months recovered very useful sight. The error I committed is instructive in several particulars—but more especially in showing how careful we should be to remove the iris completely at the angles of the wound; it shows also perhaps the necessity for having the patient's head held and steadied by an assistant during delicate operations on the eye; as a rule I do not adopt this practice in extraction preferring to leave it to the patient's own sense not to stir, neither do I as a rule allow the patient to hold the hands of bystanders as I think it conduces generally to spasmodic movements which would otherwise not take place; the trust and confidence reposed in the patient are usually responded to by quiescence. When the operation has been completed a piece of fine linen or muslin about 5" × 3" divided up the centre to the extent of about 2" is placed over the eyes the undivided portion on the forehead the division being occupied by the nose, the hollows around the eye especially at the inner angle are then carefully filled up over the linen by cotton wool and the cotton packed on so that its surface shall project beyond the level of the orbital margin and nose; over this is placed Liebreich's bandage and tied pretty tightly. By this means a uniform and equable pressure is kept up on and around the eyeball, and the bandage is so constructed that no movements of the patient's head can displace it, while it admits of being opened and reapplied and of the dressings being changed without disturbing the patient.

This modified linear extraction is not difficult of execution in full ordinarily prominent eyes such as are met with in Germany and in England; in Ireland however the eye is, particularly amongst the native Celtic population, generally small and very deep-set with prominent overhanging eyebrows, and these circumstances render the operation often extremely difficult; if a line be drawn from the eyebrow to the lower orbital margin and another from this line to the cornea the latter one measures often 6"', in one instance of flap extraction recorded in my notes it measured as much as one English inch, in this case the space from angle to angle measured not quite $\frac{3}{4}$ " and the natural opening of eyelids $\frac{1}{4}$ "; these measurements which though not common are yet

not exceptional, illustrate one of the difficulties we have to contend with in eye operations in this country, and explain the smallness of Sir Wm. Wilde's flap extraction knives, the cutting edge of which is often only $\frac{3}{4}$ of an English inch or 9''' long, the whole blade being 1 inch, while the shortest of the knives purchased by me in Germany measures 16''' in the blade, and 13''' in the cutting edge, the longest 18''' in the blade and 15''' in the cutting edge; such instruments as these latter would I need scarcely remark be quite unsuited to the generality of eyes in this country. In cases such as I have alluded to no matter how far we may rotate the eye downwards the very prominent eyebrow interferes with the execution of v. Graefe's section, and I have been endeavouring to obtain some curved or angular modification of v. Graefe's knife to meet the exigencies of the cases. Another difficulty is presented in the speculum; the best form for all purposes is that already figured which is the one for the left eye, that used for the right side having the regulating nut on the opposite arm; this nut should in v. Graefe's operation be always next the lower lid so as to be out of the way of the knife; a good practical speculum for this new extraction is still a desideratum. I have employed the rack screw speculum of Mr. Noyes, of New York, but have not found it satisfactory as it is apt to slip out, perhaps at the most critical part of the operation. The blade of v. Graefe's knife represented in Fig. 4, the natural size should be as narrow as possible compatible with solidity and strength, its point and edge should be very sharp; in sharpening instruments cutlers are apt to lessen their size and strength, and this knife is very likely to suffer in the process; in one case I had some difficulty in making the section from the fact of my knife being thus thinned and weakened. In the ordinary knives the handle where it joins the blade is usually cut sharply off nearly at right angles, after lowering the handle and pushing the instrument onwards towards its counter-puncture it has been more than once completely arrested in my hand by being caught at this part of the handle by the crossbar of the speculum; I therefore have had this abrupt termination altered and the handle tapered off as shown in the woodcut. It is advisable also to have some mark on the handle by which to distinguish readily the cutting edge from the back of the blade; it has happened that the instrument has been introduced into the eye with its cutting edge directed downwards and outwards instead of upwards and inwards. The speculum requires some

little attention from the assistant, thus it should not be allowed to press upon the globe, and its crossbar should be watched so as not to interfere with the play of the knife.

I must leave the question concerning the advisability of chloroform administration to the individual operator; if employed complete anesthesia should be produced, otherwise the unconscious struggling and muscular spasms during incomplete anesthesia will be worse than the unsteadiness of the waking and conscious individual. Chloroform renders the majority of operations much easier of execution and ensures probably in delicate eye operations greater accuracy and possibly therefore more perfect results. From my early training in St. Mark's Hospital and in Vienna I have acquired the habit of dispensing with the use of chloroform in non-painless and indeed in most eye operations and have not given it in any single case of v. Graefe's extraction. Although I have not as yet employed chloroform in this extraction I do not condemn its occasional use nor would I hesitate to use it were I pressed to do so and there were no contra-indicating circumstances; beginners and unsteady hands will find chloroform of the greatest assistance.

I do not adopt any preparatory treatment, and prefer operating as soon as possible after informing the patient of the advisability of an operation; in hospital it is desirable to operate at once for many reasons, not the least cogent of which is the fact of the patient being sometimes terrified by the alarming and often absurdly false statements made to him respecting operations by patients already in the hospital. I have not unfrequently traced the nervousness and unsteadiness during an operation to such sources. When practicable I operate on the day of admission or the day after, and as a rule only on one eye at a time. I have operated on the second in a week after the first, but two to three weeks at least should I think intervene between the two operations. I perform all cataract operations with the patient in the recumbent position I myself standing behind and above that head, being ambidexter I use the knife, needle, or forceps with the right or left hand indifferently according to the side to be operated on. I prefer the standing position as I thereby obtain greater command of view and of action than in the sitting posture; there are also some advantages I think in being ambidexter and I would advise all beginners to practice eye operations on the subject with both hands. During this as well as flap extraction it is well

to divert the patient's attention from the operation by engaging him in conversation on some interesting or to him familiar topic.

In the after treatment we must be guided by circumstances. I always have the patient placed in bed immediately after the operation; the first night I almost always give a full opiate, and throughout the treatment I order a generous dietary, with wine, brandy, or porter; the patient should not be restricted to any one position, but may be allowed to lie in the most convenient or usual posture; he may be allowed to sit up in bed on the second day and out of bed on the third or fourth day if the hospital arrangements are suitable. The bandage should be opened and the linen changed at least once a day, if there be much discharge from the eye it may be necessary to change it more frequently—but it is desirable to have the eye perfectly quiescent for the first twenty-four hours after the operation; I am in the habit of instilling atropia solution on the second day after the operation, and if any iritic complications exist earlier and several times a day. The compress bandage should be kept on for at least three days, the pressure being somewhat relaxed on the second day after the operation, unless in cases of sanguineous effusion or threatened suppurative inflammation. The bandage should be dispensed with gradually and it is well to guard against any possible accidents by replacing it at night during the whole of the first week. In the day-time the light in the apartment is to be moderated and the patient should wear coloured glasses for a fortnight at least after the operation, too early exposure of the eye is often punished by inflammatory symptoms. I have in very rare instances had recourse to depletion by leeching or cupping, when inflammatory processes did arise I contented myself for the most part with the frequent instillation of atropia, the continuance or the relaxation of pressure, the application to the brow of an ointment composed of 1 drachm of extract of belladonna and 3 drachms of mercurial ointment and the administration of suitable internal remedies such as purgatives, tonics, stimulants, alteratives and absorbents, and hitherto my results have been quite satisfactory. I have had a few instances of hemorrhage occurring some days after the operation—in one a couple of hours after leaving off the bandage; when blood is effused into the anterior chamber the compress bandage should be retained firmly applied until the blood has been absorbed. Slight serous chemosis is of not uncommon occurrence but so far as my observations extend is not by any means a

dangerous symptom; it has occurred generally without any swelling or discoloration of the lids and appears often due to the sub-conjunctival section and the escape of the newly-formed aqueous humour beneath the conjunctiva; in most of those cases the chemosis was confined to the lower part of the globe; the treatment consists in aggravated cases in snipping one or more pieces out of the raised conjunctiva with a curved scissors and allowing exit to the fluid.

Fig. 6.



The accompanying cut shows the condition of the eyes after the operation in a man aged 69. In order to illustrate the peculiarities of the operation fully I have drawn the right eye in its normal position, the left with the lid raised so as to expose the whole iridectomy as well as the track of the wound, indicated by the black line above the cornea; at the time the drawing was taken the right eye had been operated on a month, the left a fortnight; a small portion of the capsule was opaque in the left pupil and there was a good deal of vascularity about the eyeball; the iridectomy, as may be perceived, is rather large, but this is a fault on the right side; the patient presented somewhat sunken eyes and the shaggy eyebrows hung down over the eyes concealing the eyelids; this latter condition together with the frown peculiar to cataractous persons which was so marked in this individual is well rendered on the right side in the engraving which has been admirably executed by Mr. Hanlon.

The average length of time spent by the patients in the hospital from the date of operation until dismissal was 21 days, the shortest period having been 6 days, the longest 62 days; the long periods refer to patients who had both their eyes operated on. These figures contrast most favourably with those of flap extraction in the same hospital, the average number of days for which was 43 and has reference only to one eye—the second having as a rule never been operated on during the same visit to the hospital.

The apparent immunity from the dangerous consequences of flap extraction has led me to execute the peripheral linear extraction even in the most hopeless cases which formerly I would not have interfered with; and hitherto with the most satisfactory results quoad the mere operation and the recovery of the eye from its effects. Wherever there exists the faintest chance of improvement or where urged by the patient, who may have come a very long distance in expectation of an operation, I never hesitate now to give him the benefit of the doubt, and up to the present I have no cause to regret having done so in hospital practice, on the contrary the operation has in a few instances benefited the individual contrary to expectation. I have also used this operation with advantage in cases affected with granular conjunctivitis, a disease which is so prevalent in this country that it is practically impossible under present arrangements to exclude it altogether from the hospital. I entertain very decided views as to its contagious nature and consider that patients affected with it should be rigorously excluded from contact with individuals suffering under other ocular diseases.

This new extraction is also applicable to immature cataract and to cataracts with adherent pupil; one of its great advantages is its applicability to cataracts in middle aged persons or even youthful individuals; I have operated by this method on a few below 30 years of age and in one instance on a boy 11 years old affected with traumatic cholesterine cataract; the youngest age at which flap extraction is recorded in my notes as having been performed at St. Mark's Hospital is 38. The linear peripheral section may also be employed in other operations with advantage.

The crowning feature of this new method of extracting consists in the very rare occurrence of suppuration; as yet there has not been a single loss from this cause in the hospital; the only case of suppuration I have had occurred in my private practice in a gentleman whose other eye had been unsuccessfully operated on elsewhere some years previously.* Contrasting v. Graefe's new modified linear extraction with the old flap extraction it has I conceive the following advantages: it makes less demands on the volition and quiescence of the patient and requires neither the great experience nor the manual dexterity on the part of the operator nor the trained assistance requisite for flap extraction; there are fewer and

* Since writing the foregoing I have had to deplore the first and only loss by suppuration which has occurred in sixty cases of the operation at St. Mark's Hospital.

less grave casualties during the operation, and there is no difficulty with the iris during or after the operation; the size and position of the wound are matters of almost certainty; the lens can be always removed no matter how fluid the vitreous may be; the wound heals readily, there is great immunity from suppuration, the time occupied in the recovery is diminished by one-half, the after treatment is exceedingly simple, the operation is applicable to a greater number and larger variety of cases than the flap extraction. I may mention that several friends and pupils to whom I have shown and explained this operation and who then tried it themselves speak in the highest terms of the satisfactory results they have obtained by its means. As is well known it is necessary to substitute a glass lens externally for the cataractous lens we have removed; the focus of this cataract glass for distant objects is after flap extraction as a rule about $3\frac{1}{2}$ " , and for reading from 1" to $2\frac{1}{2}$ " ; in this new linear extraction a much lower powered glass answers, thus $4\frac{1}{2}$ " and 5" are very common walking glasses and some of my patients get on very well without them altogether; whether this be any advantage I cannot at present say, it shows however that this new operation does not alter the corneal curvature to the same extent as is done in the flap extraction.

In conclusion I believe that in this new operation we have a much safer and more speedy means of curing cataract than in any method hitherto practised, and one which is particularly applicable to hospital practice. I do not however advocate its adoption to the entire exclusion of flap extraction which may still be retained with or without iridectomy in some cases especially in private practice.

ART. XIV.—*Transfusion Successful in a Case of Post Partum Hemorrhage.* By THOMAS E. BEATTY, M.D., M.R.I.A.; M.D., T.C.D., Hon. Causa; Ex-President of the King and Queen's College of Physicians in Ireland; Ex-Professor of Midwifery, and formerly Professor of Medical Jurisprudence, Royal College of Surgeons in Ireland.*

MRS. ———, aged twenty-four years, a very handsome, tall, well-made lady, had a premature confinement of her first child at the fifth month, in January, 1867. She became again pregnant, and was delivered of a large healthy boy, at the full time, in July,

* Read at Obstetrical Society April 9th, 1870.