✓ Clinical Remarks

ON

MODIFIED LINEAR EXTRACTION.

BY

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I.—RECENT EXPERIENCE. THE CLAIMS OF THE METHOD.

THE method of operation which I recommended in the last volume (xi) of the *Archiv für Ophthalmologie** has been further extensively tried. It was applied without exception to all cataracts in the advanced and middle periods of life, but was also resorted to in the young, except where, as in children with congenital or zonular or retrogressive cataract, discission was plainly indicated. So general an application of the plan I held to be warranted by the results it had yielded me, and especially calculated to promote a solution of the question, whether the proceeding deserved to be adopted as the universal method—i. e., in the place of flap-extraction.

The number of operations performed by me in a year's time, in accordance with the prescribed rules, amounts to about 300. It is not my intention here to give a detailed account of the results; this will be done in a more conclusive manner when observations shall have been further multiplied. On the present occasion, the following data may suffice.

In 90 per cent. of the cases, a perfect success was obtained (S between $\frac{1}{2}$ and $\frac{3}{4}$); the after-course having in 82 per cent. been absolutely normal, and in 8 per cent. connected with temporary accidents, such as irritation of the wound-channel or the iris and capsular cells, small prolapses of iris near the corners of the wound, and slight transitory vitreous opacities.

In 10 per cent., the result as regards vision left much to be wished for. Among this number, however, by far the majority are but imperfect results, not failures; and most of the former, again, such as to warrant the expectation of a perfect result being obtainable by secondary operation.

In anticipation of exact and comprehensive tables, in which the results of the after-operations will be recorded, we may consider a total of 97 per cent. of perfect successes (S better than $\frac{1}{2}$) to have been, so far, the outcome of our operation.

These results, considerably more favourable than those which I have obtained by flap-extraction, will yet appear enhanced in value if the following circumstances are taken into account. In order to test the plan as thoroughly as possible, I neglected many of those cautions regarding season, species of cataract, and constitution, which, in the case of flap-extraction, I used conscientiously to observe. Thus, e. g., in old or indigent persons, who were afraid of a repetition of their journey, the still immature cataract of the second eye was often removed within a week or two after the extraction of the ripe cataract from the first eye. Under similar circumstances, I have even

operated for a number of cataracts, which, though they interfered already much with vision, could yet, from the indifferent depth of the opacity, be regarded as incipient merely. In middle-aged persons, the operation was repeatedly resorted to for lenticular opacities of a zonular character, or such as have their seat in the posterior cortex, while the body of the lens retains its transparency—i. e., cases in which formerly either modified discission was performed, or the capsule opened, preliminary to extraction, or else we preferred to temporise, in expectation of greater maturity. Again, that I might ascertain the influence on the patients of general and local complications, the operation was advisedly performed under the most adverse conditions in both senses. As examples, I may cite an exquisite case of facial spasm, which, by the mere touching of the eyelid, was raised to such a degree as to preclude an accurate examination of the cataract previously to the operation (the result was panophthalmitis on the one side, and S = $\frac{1}{2}$ on the other); a case of senile cerebral atrophy, leading to an attack of mania the day after the operation (result perfect on each side); some cases of conjunctivitis with discharge, granulations, affections of the lachrymal passages—i. e., disorders which for the most part I would have sought to mitigate prior to flap-extraction; again, the rather frequent complication with staphyloma posticum, combined with affection of the vitreous humour; and, lastly, some cases of chronic iritis or irido-cyclitis. I must also not omit to mention that in several points (such as the formation of the conjunctival flap, the evacuation of the lens) the proceeding was not unfrequently varied, although these tentative modifications were abandoned later as unsuitable.

If, in spite of all this, the results were such as have been mentioned, whilst, besides, we find the recovery to be comparatively speedy, and less fraught with inconvenience to the patient, the conclusion appears to be warranted, that the method might with advantage be generally adopted.

I must, however, once more return to the question whether, under certain circumstances, the preference should not be given to flap-extraction. If I abstained from a decisive answer to that question at the time when I published my first paper on the subject, I did so from the consideration that, in an individual case perfectly adapted and auguring well for flap-extraction, some untoward accident—e. g., rupture of the vitreous humour—might occur while linear extraction was resorted to, and materially impair the chance of recovery. My misgiving was based on the experience that, from the attending difficulties of performance, irregularities did not unfrequently occur in the operation. Continued practice, however, and increased familiarity with the proceeding, have greatly diminished my apprehensions. Owing to the more general adoption of the slide-mancuvre, prolapse of vitreous humour has become less frequent, the evacuation of the lens more complete, and the special manipulations for the removal of surface-matter less often needful. Consulting my sufficiently explicit journal in reference to those cases in which the after-course proved abnormal, I scarcely find a case the features of which had made it appear especially adapted for flap-extraction. On the contrary, amongst those cases which were particularly unfit for the latter operation, so large a percentage recovered speedily and without a hitch as I have never been able, in a practice now extending over many years, to obtain from flap-extraction in any extensive series of operations. It is impossible, of course, in any unsuccessful cases, to prove or disprove that a different plan might have yielded a satisfactory result. No doubt, in one or other of the less

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fortunate cases, flap-extraction might have been crowned with better success. But a mere guess of the kind cannot be allowed to be our guide in any future emergency. Who would deny that many an eye, lost after flap-extraction, might have been saved, had reclamation been the method resorted to? Nevertheless, we repudiate the latter as an unreliable proceeding, since the positive evidence of the past, on which alone our calculations can be based, pleads for extraction.

From all the foregoing, it appears that we need not hesitate any longer to affirm that *modified linear extraction is entitled to be further cultivated as the exclusive method of cataract-extraction*—i. e., not as an alternative only, but as a substitute for flap-extraction.

For all that, I am far from insisting that any one who has long and successfully been devoted to flap-extraction should, on my recommendation, at once abandon it for linear extraction. It will, perhaps, be more in the interest of this method, as well as of the patients, that it be adopted considerably and by degrees. If, first, those cases which do not appear to favour flap-extraction are selected for modified linear extraction, a tolerably experienced operator, carefully observing the prescribed rules, will not incur the risk of forfeiting the real advantages of the method by the want of practice. Gradually, with increasing familiarity, and should success encourage, the plan may be more generally resorted to.

II.—POSITION OF THE PATIENT.

The patient to be operated on is invariably placed on the couch. The position of the couch depends on the illumination of the operating room. Where there is sufficient light from one large window, the couch may stand perpendicular to the latter, or at least nearly so; the head end being, of course, the most distant. This disposition of the couch has the advantage that, in our manipulations from the temple of the patient, but little light is cut off from the field of operation. Where the illumination is less intense and reliable, as is the case with most localities, it is better to place the couch nearly parallel to the window, or at most with the head end slightly more remote from the latter. The eye to be operated on should be nearest the window. The opposite practice, it is true, has the advantage, that during the excision of the iris the shadow of the hand does not project itself over the field of operation; yet I find this of less importance than that the exact control of the counter-puncture should suffer from the shadow of the nose, as it is particularly apt to do in the case of a deep-set eye, if not nearest the window.

In the operation on the left eye I first take my seat on the couch to the left of the patient, and, after the incision and the iridectomy have been made, I go to occupy a chair behind his head. As in the interval between the second and third steps of the operation the steady forceps require to be taken from the hand of the assistant, and the cystitome to be seized, the short delay involved in the change of seat is of no importance. A really ambidextrous operator may, from the beginning, sit behind the head end of the couch and perform the incision and iris-excision (on the left eye) with his left hand.*

The operation on the right eye I perform throughout from behind the patient's head. Only the pressure, if required, for the separate removal of

surface-matter is again better effected from before the patient. The chair behind the patient's head should be a high one (if the surgeon do not prefer to stand), to enable the operator to survey the field of operation with his head slightly bent forward and without having to raise his hands inconveniently. The head is fixed by the two hands of an assistant, flatly applied to the temples of the patient, a practice which recommends itself for all operations on the eye. By this means, should the light be insufficient, the head can easily be inclined towards the window.

III.—ANÆSTHESIA.

As regards the advantages of chloroform, I was rather undecided in my first paper. I then believed that I might find it necessary to employ the drug more extensively. In this I have not been borne out by the event. Whilst among the first sixty-nine cases there were seven in which the anæsthetic was resorted to, it has since, in thrice the former number, been used but fifteen times—i. e., in seven per cent., instead of ten per cent. as before. What induced me, in spite of my antipathy to deep anæsthesia, at the time to augur as I did, was the frequency of prolapse of the vitreous humour (in fourteen per cent. of the cases), and the hope by means of chloroform to limit the occurrence of this irregularity. But, as I have hinted already, and shall have to state yet more explicitly in the course of this paper, the accident has become much less frequent. Besides, I have convinced myself that the anæsthesia, however satisfactorily induced, does not in every sense facilitate the operation. Where the evacuation of the lens is to be effected by mere external pressure (the slide-manœuvre), the natural action of the muscles, unless it exceed certain limits, affords us in some cases very valuable assistance. In cases where the cortical matter is tough and adherent to the capsule, its removal is apt to become very difficult in the absence of all muscular action, and may necessitate the employment of the hook. On this point, however, I am not inclined to lay particular stress; since, in the majority of cases, the muscular pressure will, no doubt, prove rather hurtful than otherwise. But there is another circumstance of greater weight. For the removal of surface-matter which remains after the nucleus has come forth, we need the co-operation of the patient's will, who is required to look down as much as possible, to assist us in the necessary manœuvres. But, before he becomes able to do so, if thorough anæsthesia had been induced, the delay which is unavoidable may prejudicially affect the operation.

There can be no doubt that, under certain circumstances, chloroform is of the greatest advantage. This applies, above all, to those cases in which the muscular pressure is excessive, partly from mechanical causes, such as abnormal tightness of the eyelids, prominence of the eye, blepharophimosis, and partly from extraordinary reflex irritability or want of self-control. Again, there are those exquisitely nervous individuals, whom the mere idea of pain distresses, and in whom the actual infliction produces that depression of spirits which is so legitimately dreaded in regard to the recovery from cataract operation. For such persons, anæsthesia is a real blessing; but it is, after all, a matter of surgical tact to discover the presence of the disposition described, and correctly to estimate its significance. It is possible, therefore, that, as the individuals differ who present themselves for operation, the percentage of anæsthesia may come to vary accordingly. The experience which I have so far gained leads me to repudiate the universal employment of the anæsthetic even more strongly as before, and to pronounce in behalf of its

* That no advantage attaches to the cultivation of the left hand, as regards eye-operations, I have (in accordance with Maligne and others before me) stated on various occasions. The time is past, we think, when vanity or false reasoning prompted the creation of difficulties in surgery, and beginning oculists should pursue more useful exercises than the struggle with the natural privileges of our right hand.

conditional administration, at all events in the decided minority of the cases.

IV.—RETRACTOR. STEADYING FORCEPS. INCISION.

The screw-retractor which I use at present differs from the one formerly employed, in that the handles are more strongly bent backwards, so that after the insertion of the instrument they lie more closely applied to the temple. This, particularly when the eyes are deep-set, facilitates the action of the knife. Another modification by Professor von Welz is this, that both arms, just before the cross-bar, have small semicircular wings attached to them. They enable the fingers to get a better hold, and prove particularly useful in the removal of the instrument in its new shape.

As regards the application of the steadying forceps, I would, even more strongly than before, insist that it should be made exactly beneath the lowest point of the cornea. Any departure from this spot not only renders the localisation throughout more difficult, but during the third and fourth steps of the operation causes actual trouble. For, as I shall mention hereafter, at that period the steadying forceps should, in exact co-operation with other instruments, exercise an appropriate pressure or traction; and this, unless the above rule be strictly observed, cannot be done correctly.

The sclero-corneal incision was invariably made in exact accordance with the original rule. Possibly, for the thoroughly compact species of cataract, a knife may come to be preferred about $\frac{1}{4}$ " broader, and the puncture and counterpuncture made $\frac{1}{8}$ " lower down. Thereby the middle of the incision would not be affected, but the wound-channel lose somewhat in steepness—a flap of very little height being formed. All instruments of traction might thus become needless and simple external pressure (the slide manœuvre) be sufficient to deliver the lens without bruising. This, it appears to us, is the only concession which the method might have to make to the principle of the older incisions. At present, however, we are not satisfied of the desirability of the change, and prefer to adhere to the strictly linear principle of our plan.

The size of the conjunctival flap was the object of many experiments. I was naturally desirous to ascertain what is the influence exerted by the conjunctival flap or of its size upon the relatively speedy and safe recoveries which characterise our proceeding. From November 1865 to February 1866, in about one hundred operations, generally large conjunctival flaps were made, and within that number the precise measure was again varied for smaller series of operations. Thereupon, from March to the middle of May 1866, in upwards of one hundred operations, the conjunctival flap was made smaller, and sometimes concave at the apex, so that its height at the middle (even when stretched on the knife before the emergence of the latter) did not amount to more than 1". Occasionally the flap was purposely curtailed, so as to be entirely deficient at the middle and only to cover the wound about the corners. My inferences from these parallel experiments, all other circumstances being carefully taken into consideration, are as follows.

1. The presence of a conjunctival flap covering the wound in its whole extent, although it expedites the recovery and furthers the consolidation of the cicatrix, has but a subordinate influence upon the definitive result of the operation. So I was justified in assigning to the conjunctival flap only the third place among the advantages of the plan.

2. Small differences in height of the conjunctival flap are of no importance whatever. On the whole,

it is better for the flap to be made somewhat concave at the apex than to be prolonged into a tongue-like process. The latter form involves a greater tendency of the conjunctiva to roll up and swell, whilst the former shape particularly favours that expansion and lateral tension which I have dwelt on in my former paper.

3. Very extensive conjunctival flaps, the summit of which in the distended condition extends further than $1\frac{1}{2}$ " from the corneo-scleral junction, or even approaches the conjunctival reflection, are not to be advised. The incision, in this event, falls into rather vascular portions of the conjunctiva, and into the loose subconjunctival tissue; and hence is apt to induce considerable bleeding. If the flow of blood be towards the surface, so that the small coagula may be easily removed with forceps, the accident is of no importance. But if there be a tendency to collapse of the cornea, and, from deficient pressure in the anterior chamber, the blood make its way into the latter, the course of the operation may be disturbed. Worse still, if the blood infiltrate the conjunctiva itself and the subconjunctival tissue, as this is followed by a certain swelling of the parts and an annoying sensation of pressure, and may even give rise to serious irritation. The peripheral portions of the conjunctiva are, no doubt, more strongly disposed for pathological secretion. Moreover, if the conjunctival wound fall too distant from the margin of the cornea, it becomes more gaping, and thereby, unless sutures be had recourse to, great cause is given for irritation.

Lastly, by too extensive a conjunctival flap, the slanting wound channel between the aperture of the mucosa and the sclero-corneal border is unnecessarily lengthened. Increased resistance is thus created to the escape of surface matter and of blood, and perhaps, by the enlarged extent of wounded parts, the proliferating tendency is directly enhanced.*

On the whole, I adhere to my original practice, making, however, the flap, as I have said, somewhat concave at the apex. If the conjunctiva be very loose, easily torn, and prone to bleed and swell, the flap is made of still lesser height.

A very deep-set eye, narrow palpebral fissure, or shallow anterior chamber, are circumstances which may increase the difficulties of the incision, but real obstacles to the action of the knife I have not proved them. Only once it has happened to me, on account of unusual shallowness of the chamber, to excise a peripheral piece of iris. In such an event, if the gap which has been produced hide itself beneath the scleral border, care must be taken in the following step of the operation to cause the remaining bridge of iris to prolapse as completely as possible. Else, to avoid entering the gap, the forceps should first be advanced from one of the corners of the wound and deviate from the vertical direction so long as we are not sure, instead of pushing the iris forward duly to operate betwixt cornea and iris. If this be neglected, the forceps, though it succeed in getting hold of the iris, might at the same time injure the capsule, and thereby the systematic opening of the capsule would be threatened to become irregular.

[To be continued.]

* It is true, that under these circumstances the escape of aqueous humour is readily arrested, since the swelling of the subconjunctival tissue soon opposes a barrier. Yet, however greatly in general we desire an intimate contact of the wound-edges, it appears that under certain circumstances too early a stoppage of the current is fraught with disadvantage, similar to what we observe when a wound in the skin closes rapidly, whilst pathological secretion continues underneath. If at an early period after the operation symptoms of irritation present themselves, connected with the secretion of a morbid aqueous under increased pressure, the periodical oozing of fluid through small fistulous openings (mostly about the apex) may have to be regarded as a wholesome overflow.