I NOW pass to the consideration of the origin and nature of strabismus.

CONVERGENT STRABISMUS.

What are the different facts to be noted, and how are they to be explained? In the first place, the strabismus is not congenital. It usually develops between the ages of two and four, though in some cases it shows itself earlier, and in not a few later.\(^1\)

At first the squint is only seen occasionally, and mostly when the child is intently fixing a near object. It gradually becomes more and more permanent. In all such squints it is easy to distinguish two elements—a permanent one, constant in amount; and an accommodative one, or an increase of the deviation which only occurs on accommodation, and which is greatest for the fixation of near objects. The accommodative degree of squint remains practically the same always for the same distance of fixation. The degree of the permanent element, on the other hand, increases with time up to a certain extent, and then remains constant, sometimes again diminishing in later life.

In a very considerable proportion of cases of convergent strabismus the eyes are hypermetropic. The proportion in which this is the state of refraction is greater the younger the individual. On the other hand, but a very small proportion of hypermetropes squint. It is not uncommon to find in a family of hypermetropes of much the same degree, some who squint and some who do not.

In the great majority of cases there is found to be, in addition to hypermetropia, or independently of that refractive error, defective vision of the squinting eye. The defect is usually considerable, though it varies in amount in different individuals. It is rarely so great as to lead to eccentric fixation, when the squinting eye is used on the occlusion of the other. As a rule, therefore, the squinting eye takes up fixation when the one, usually fixing, is covered. In some cases, indeed in most in which the eyes are equally good, the squint is not unilateral, but alternating, and then

---

\(^1\) A congenital convergent squint is of a different nature from the ordinary squint, and is due to paresis of one or both external recti. The origin of this paresis need not here be referred to.
the right eye is generally used for fixation to the left, and the left eye for fixation to the right.

Sometimes the strabismus is only periodic, and may even appear with tolerable regularity every second or third day, disappearing in the interval. There is then, generally, binocular vision, and consequently diplopia during squinting. A periodic squint may, however, exist where binocular vision is impossible, owing to great defect of vision of the one eye.

Although a convergent squint usually develops slowly and gradually, it does sometimes happen that it makes its appearance quite suddenly.

The great characteristic of ordinary squint is its _concomitancy_, that is to say, the fact that an equal angular deviation is maintained for all directions of fixation, so long only as the distance of the object fixed remains the same. It is this fact which gives the name of _concomitant strabismus_ to the ordinary squint. The term is a good one, and much more suitable than that of _muscular strabismus_, which is often applied to it, especially in Germany. The concomitancy is not only apparent, but may be confirmed by accurate measurements.

In all convergent squints there is a more or less evident restriction of the outward movement of both eyes. But this restriction is never so great as the squint, i.e., the angular defect in rotation outwards is not so great as the permanent angular deviation from the direction of correct fixation. In point of fact, its size is but a small fraction of that of the squinting angle.

The refraction in a convergent squint is sometimes emmetropic, and occasionally even myopic. The so-called _strabismus convergens myopicus_ differs from the ordinary concomitant variety, in that no increase in the amount of squint takes place on near fixation. In fact, the abnormal manifest convergence at first only exists for fixation beyond the far-point, and is always associated with more or less troublesome diplopia.

We have now to inquire what it is that leads to strabismus. The proper explanation, in so far as the temporary accommodative element of the squint goes, was first given by Donders. In his study of the range or amplitude of accommodation, Donders found it necessary to distinguish between—(1) The _total uniocular range_, i.e., the change in refraction of the one eye alone, when, from being focussed for its farthest point, it becomes focussed for its nearest point, of distinct vision; (2) the _total binocular range_, always somewhat less than the uniocular; and (3) the _relative amplitude of accommodation_, or the amplitude which exists for a definite degree of convergence.

Up to convergence on the binocular near point, there exists for every degree of convergence an amplitude of accommodation, part of which is what Donders termed the _negative_ portion; that is, all lesser degrees of accommodation which can possibly be associated
with any particular degree of convergence; and part which he called the \textit{positive} portion, which includes all the greater degrees of accommodation which may possibly be associated with the same state of convergence. Any degree of accommodation outside this range is not compatible with the binocular fixation of objects, situated at the distance on which the eyes converge. Donders further found that accommodation can only be sustained for a distance for which the positive portion of the relative range of accommodation is not too small as compared with the negative portion.

A hypermetrope has already to make an effort of accommodation, in order to see distinctly at a distance. He therefore begins convergence with a defect of accommodative power, so that with increasing convergence his amplitude of accommodation proves sooner insufficient than in other states of refraction. Although he becomes, from habit, accustomed to associate a high degree, it may be, of accommodation with a slight amount of convergence, the positive portion of his relative range of accommodation may, to begin with, be too small, as compared with the negative portion, for even moderate degrees of convergence. Fatigue further reduces the positive portion, and eventually abolishes it altogether. The binocular near point, therefore, recedes from the eye. The strained feeling in or about the eyes to which this gives rise in hypermetropes with binocular vision is what is now well known as accommodative asthenopia.

Hypermetropes have a way out of this difficulty. They may renounce binocular fixation altogether, and this is what some, though only a small proportion, actually do. In doing so they squint. The one eye only is used for fixation, and the axis of the other crosses that of the first nearer than the object fixed. In Donders' own words: "The connection between hypermetropia and strabismus is an evident one. By more powerful convergence the hypermetropia can be more readily overcome, and by the sacrifice of binocular vision the sight be sharper, with one eye, and more easily sustained for near objects. In this lies the explanation of why the deviation at first only takes place on fixation, and also at a time of life when one begins to take sharper notice of things. . . . Although convergent strabismus is thus readily explained as a result of hypermetropia, it is by no means a necessary consequence of that state. The number of hypermetropes who squint is, in fact, relatively small. Evidently, then, its origin is resisted by the instinctive retention of binocular vision." It is, therefore, only comparatively rarely, then, that binocular fixation is renounced and asthenopia avoided by a recourse to strabismus. The conditions under which this is most apt to take place are all such in which the value of binocular vision is reduced by defective sight in one eye.

The squinting eye, as I have said in enumerating the symptoms of strabismus, is usually found to have more or less defective
vision. The defect is mostly due to some optical imperfection (irregular and regular astigmatism, corneal or lenticular opacities, etc.). Sometimes there are changes in the retina. The amount of visual defect originally existing, and leading under favouring conditions to the giving up of binocular fixation, is generally supplemented by a further degree of weakness of sight, due to the habitual mental suppression of the images received by the squinting eye. This is what has been called amblyopia from disuse. This element not unfrequently constitutes a very preponderating proportion, and sometimes, indeed, the whole of the existing amblyopia. It quickly disappears, as soon as conditions are introduced which cause the attention of the individual to be directed on the impressions which the eye receives.

It used to be a habit with ophthalmic surgeons to recommend the tying up of the fixing eye from time to time, in order that the use of the squinting eye should be practised, and thus amblyopia avoided. Indeed, this is still practised by some oculists. It is, however, but one of the remains of the many inconveniences which have been imposed upon squinters in the way of treatment, and is almost always quite useless. Of this I am convinced, from the result of an examination made many years ago in a large number of cases, where, for a week or more at a time, the fixing eye, if hypermetropic, was disabled by the instillation of atropine, so that the patient was compelled to use the other for fixation. So soon as the fixing eye is liberated it takes up the work afresh, and the images on the squinting one are suppressed as before. Moreover, when from disease or accident to the eye which has previously been the master one, the other, from being the squinting eye, has to permanently assume the position of the fixing one, it soon regains all the power which it possibly can, whether it has previously been practised so many hours each day or allowed to remain for years without being used. It would appear that in some few cases the tying up of the fixing eye, by favouring diplopia, when it is again uncovered, may facilitate the re-establishment of binocular fixation after operation. Of this, however, I have no personal experience.

Apart, however, from amblyopia of one eye, there are some hypermetropic children who are so indifferent to the value of binocular vision, or rather one might say unobservant of, and not greatly inconvenienced by, the diplopia which its renunciation entails, that they readily adopt a squinting position in preference to asthenopia, and soon, by suppression, lose their diplopia. In this case the strabismus is mostly alternating.

In a few cases in which there is a considerable degree of latent convergence, but in which any manifestation of strabismus is always being prevented by the power of fusion, a manifest squint may suddenly develop. In such cases there is always diplopia, and the cause of the sudden manifestation of a hitherto latent
condition is simply a loss of fusion power. This may be the result of some general bodily weakness or of some cerebral disorder or disease. Thus, in children, continued irritation from teething, or worms, or a sudden fright, or severe fall on the head, not unfrequently leads to this manifestation of a hitherto latent squint (not always of a high degree) by directly interfering with the amplitude of fusion.

In illustration of this more suddenly developed variety of convergent strabismus, I may cite the following:—A few weeks ago, we had occasion to see at the Infirmary a child, ât. 9, who had suddenly developed a perfectly concomitant convergent strabismus with diplopia. The vision in both eyes was equally good though not quite normal, and ophthalmoscopic examination revealed a double optic neuritis.

Sometimes, again, fusion seems to be strained to such an extent, to prevent the manifestation of a latent convergence, that any undue fatigue will cause the appearance of squint with diplopia. I have, for instance, seen a child who almost daily got a diplopia from this cause, and was in the habit of going to sleep for an hour or two to get rid of it. I have seen others in whom diplopia from concomitant convergent squint appeared periodically. In one case this occurred every alternate day, so that one day's squinting provided the rest that was required to overcome by fusion the tendency to over-convergence for the next day.

So far, then, as we have traced the development of squint, it has been that of the purely accommodative element, and the condition of the ocular muscles is in no way different from that which exists on binocular vision of a near object. The eyes, therefore, follow each other from side to side, just as they do when a near object at a constant distance lies successively in one direction or another from them. Fig. 14 shows this. It will be observed that it only differs from Fig. 1 in that the axes cross nearer than the point of fixation. The deviation (d) is twice the angle of the squint (s) or
the angle of excess of convergence. And the impulse to this excessive convergence is equally divided over both eyes, in the same way as is the impulse to convergence necessary for fixing a near object binocularly in a line with the one eye. The eyes in the squinting position follow each other, too, from side to side, maintaining all the time the same deviation just as they do when fixing, binocularly, near objects. This is how the squint comes to be concomitant. Further, just as the limit of outward rotation is reached sooner when the eyes are strongly converged in binocular fixation than when no convergence of the axes is required, so it is with concomitant convergent strabismus. This is the explanation of the restriction in the outward mobility of the eyes in a squint, which is often taken to be an indication of weakness of the external recti muscles. I have already stated that this defect in mobility outwards is always small when compared with the angular amount of squint. It is often apparently greater in the squinting eye itself than can be accounted for in the manner just explained. The reason for this, however, is want of habit. The squinting eye is never, under the conditions in which it is employed, directed very forcibly outwards, so that it requires an unwonted effort of will to bring it to its possible limit in this direction. This limit can, however, always be reached, although with more or less difficulty.

We have still to explain the nature of the permanent element of a convergent squint. If the squint arises on accommodation, under such conditions as have been described, why should any squint remain on cessation of accommodation? As a matter of fact, there is only an accommodative squint to begin with; the permanent element slowly develops. This latter has often been, and in fact is very generally still, assumed to be due to structural changes taking place in the internal rectus of the squinting eye, whereby it becomes permanently shortened. Many authors assume at the same time a weakening or so-called insufficiency of the externus from disease. The evidences against such an assumed structural change taking place are so strong that to my mind they are absolutely conclusive. I shall here only refer to three of the most important:

1. The temporary disappearance of the squint under general anaesthesia, as well as its occasional gradual disappearance in adult life;

2. The perfect concomitancy of the squint, even when it is mainly of a permanent nature; and,

3. The absence of any anatomical demonstration of structural changes in the muscles.

As to the first, one invariably sees, when the anaesthesia is sufficiently deep, that the effect of a tenotomy is much greater than it proves to be after recovery from anaesthesia. Occasionally, too, a squint disappears altogether under anaesthesia, without operation.

As to the complete concomitancy, it is only right to say that
some writers question this. Javal, for instance, in his recently published "Manuel du Strabisme," adduces the following as a proof of concomitancy being far from complete. He says: "If an obscured glass be placed in front of the good eye, and the one habitually deviating be forced to fix an object, the deviation then produced in the good eye, or the secondary deviation, is found to be slightly less than the primary; whilst, on the contrary, the deviation increases when, with both eyes free, the individual succeeds in squinting with the better eye." Now it is quite clear that this perfectly correct observation is no evidence of want of concomitance. The squinting eye, though always necessarily accommodating to the same extent as the other (a fact, by the way, which Javal seems to forget), does often not accommodate as strongly as it is otherwise forced to do, when it has to assume the initiative on being called upon to fix. This smaller extent of accommodative effort is, of course, shared in by the occluded and ordinarily fixing eye, and there results a correspondingly smaller angular deviation. On the other hand, inasmuch as the hypermetropia of the squinting eye is often greater than that of the fixing one, when the squinting eye is got to fix, and at the same time accommodate accurately, there is produced a corresponding accommodative increase in the deviation.

The only legitimate way to test the concomitancy is to measure the deviation for different directions of fixation of the same eye, under conditions which as nearly as possible insure equal efforts of accommodation. Tested in this way, the accuracy actually found is so nearly complete, that, considering the limits of experimental error, no doubt can exist as to the coextensive symmetrical response of the muscles, even in long-standing convergent squint, to the perfectly equal stimuli which they receive.

I have laid stress at the beginning of this lecture on the fact that any weakening of a single muscle must of necessity render concomitancy impossible, and introduce conditions comparable to paresis. After tenotomy, for instance, concomitance is lost, and it is long before it is approximately regained. When the tendon of the right internal rectus is separated from its attachment to the sclera, for convergent squint, the deviation which before was the same for all directions now constantly diminishes for fixation further and further to the left, and constantly increases for fixation further and further to the right.

As to the third point, to which, however, I do not attach so much importance, it does seem significant that, notwithstanding the abundance of material which is to be found everywhere, no one has as yet brought forward either macroscopic or microscopic evidence of structural change in the muscles.

To what, then, is the permanent element of the convergent strabismus due? There can be little doubt that it is simply the gradual persistence of the increased and abnormal degree of
convergence which is constantly brought into play by the accommodative squint. This explanation, that the permanent as well as the accommodative element of a convergent strabismus is simply an increased innervation to convergence, was first given by Hansen Grut. In his Bowman lecture, too, he gives reasons for holding that the habit of converging leads gradually to a withdrawal from the voluntary disposal of the individual of a greater and greater amount of the amplitude of convergence. This he expresses as follows: "The constant habit of convergence displaces the functional position of rest more and more inwards."

The various arguments here adduced point to convergent squint being entirely innervational, while the result of the examinations under different conditions of the latent position of the ocular muscles, in individuals who have retained binocular vision, points, as has already been said, to the strong tendency that there actually is for convergence to persist in the manner in which it is constantly called into play. This being the case, it is not difficult to understand how, when convergence is overstrained from any cause, a permanent squint may develop in other states of refraction than hypermetropia. Certainly hypermetropia is much the most common predisposing cause, but excessive use of the eyes may, in emmetropes and also in myopes, lead to a latent convergence, which may in turn, though much less frequently, develop into a manifest strabismus. Over-convergence may, for instance, be induced in any condition of refraction by paresis of accommodation. The existing relation between accommodation and convergence is then interfered with, and the defect in accommodative power unconsciously counteracted as far as possible by too powerful convergence.

In the interesting variety of convergent strabismus in myopia the development may be followed through its different stages. An uncorrected or imperfectly corrected myope, who is in the habit of reading for long periods on end, finds that for some time after he has ceased to read, distant objects, if seen sufficiently distinctively to attract his attention, appear double. At first this doubling of distant objects is only temporary. After some time it becomes permanent, because of the greater persistence of convergence, and because, vision being less perfect for distance, fusion does not exert so powerful an influence in overcoming this convergence innervation. After a longer and longer time the distance at which objects appear in homonymous double images becomes shorter and shorter, and eventually a squint, at first only manifest beyond the far point, has reached inwards until it exists for nearer fixation. In this variety of convergent concomitant squint there is, however, always this difference as compared with the hypermetropic squint, that no increase in the angular deviation takes place for near fixation.
To sum up, then, in a few words, the nature of convergent concomitant strabismus, we may say that it is the active state to which the equilibrium of the muscles leads when the interni have for long continued to receive an abnormal degree of innervation to convergence.

Divergent Strabismus.

Divergent strabismus is also concomitant, except when it arises from paralysis of one or both interni, or injury to, or mechanical interference with, the action of either of these muscles. The most frequent state of refraction met with in this form of strabismus is myopia. But the preponderance of myopia is not so marked here as that of hypermetropia in concomitant convergent strabismus. It is a common enough occurrence in cases of more or less blindness of one eye, especially where the condition causing the blindness has arisen in adult life. The divergence develops, as a rule, slowly; sometimes suddenly, but only then in some cases of sudden unioocular blindness. The degree differs somewhat in different cases, but seems at the most to be from 10 to 12 metre-angles. It is never as high as that met with in complete internus paralysis, or after an unsuccessful tenotomy of the internus by Dieffenbach's method, a kind of case which is now very rarely seen.

It is often at first and may for long remain relative only, i.e. there may be a manifest divergence for near vision but no absolute divergence. Relative manifest divergence is peculiar to myopia. It is always associated with more or less complete absence of converging power.

Donders first clearly indicated that a causal connection existed between myopia and divergent strabismus. His explanation, however, of the reason for this connection is in some respects unfortunate. In particular, he ascribes too much importance to the muscles themselves and too little to innervation. Amongst the consequences of a high degree of myopia he mentions "interference with the movement of the eyeball, with absolute or relative insufficiency (insufficient action) of the internal recti." This idea is further developed by Donders in the following statement:—"Freely movable emmetropic eyes can bring the lines of vision to cross in the mesial plane at less than 2 in. in front of each eye, under an angle therefore of 80° or 70°. If the crossing point of these lines be more than 2½ in. from the centres of rotation of the eyes, which corresponds to an angle of convergence of about 51°, we may then generally assume an insufficiency of the internal recti."

This so-called "insufficiency" is further ascribed by Donders to a mechanical interference with the action of the interni, caused by the elongation of the globes, highly myopic eyes being very considerably longer antero-posteriorly than emmetropic eyes. It is important to notice, however, that this supposed mechanical interference does not affect the lateral associated movements of the
eyes. After the divergence has become so far established that it is absolute, and binocular vision is lost for all distances of fixation, it is found that little or no convergent movements can be made; whereas, not only is lateral mobility retained, but lateral movements take place in such a manner as to leave the deviation unaltered in extent for all directions of fixation. This characteristic concomitancy is, then, a proof that there is no actual muscular defect. In fact, it is sufficiently evident that whereas, as in convergent concomitant strabismus, there is an active innervation to over-convergence, there is in divergent strabismus more or less complete absence of innervation to convergence. There is, therefore, not insufficiency of the interni, but insufficiency of convergence. The convergent impulses are gradually lost from disuse. In the case of high myopia it is more or less difficult or impossible for the eyes to maintain a degree of convergence which is sufficient to fix binocularly objects at the far point. Relative divergence, therefore, which is what is first manifested, gradually passes into
the absolute form, because, owing to the defect of distant vision, double images are readily disregarded. The fact that under these circumstances, however, there can ever be absolute divergence, shows that the functional position of rest of the eyes in the constant enfeeblement or absence of convergent impulses is a divergent one.

The divergent deviation shows itself on one eye alone, for the reason that, binocular fixation being impossible, one of the two diverging axes must be directed on the object on which attention is fixed. This necessitates a movement inwards of the fixing eye, with which is associated an outward movement of the other. This is shown in Fig. 15. The condition is, in fact, the exact counterpart of that shown in Fig. 14.

Divergent squint differs, however, from convergent squint in another way. There is no active contraction of the externi in divergent, as there is an active contraction of the interni in convergent, squint. Indeed, it is very doubtful if there is such a thing as innervation to divergence at any time. Except to restore the position of parallelism to the eyes which have been converged, and this probably takes place in another way, it could serve no useful purpose in vision.

Divergent concomitant strabismus is, in fact, the \textit{passive state to which the equilibrium of the muscles leads when the internal recti receive little or no innervation to convergence.}

\textbf{Effect of Tenotomy.}

Of the two forms of concomitant squint commonly met with, then, the one is an \textit{active} and the other a \textit{passive} condition. It is this essential difference which accounts for the difference in the effect gained as a rule on tenotomy of the internus for convergent strabismus, and on tenotomy of the externus for divergent strabismus. Tenotomy of the internus, which is actively contracted under an impulse to convergence, is followed by retraction of the muscle. It forms, in consequence, an adhesion to the sclera posterior to that which it formerly had, and that equally, whether the tenotomy be performed on the squinting or on the fixing eye. Tenotomy of the externus, which is in a passive state (beyond the amount, which possibly varies in different cases, of its tonic innervation), is followed by little or no retraction, so that a new attachment to the sclera is formed, in the absence of any convergent power, at much the same place as that from which the separation was made.

Further, the cause of the squint continues in both cases after operation, although the effect of the position of the eyes is altered in the first case, and not generally in the second. This being the case, the continuance or increase of convergent innervation may, in the course of time, lead, after an operation in which a good
position has been obtained, to a return of convergent squint. Or, again, the discontinuance or diminution of convergent innervation, after a similar operative result, may lead to divergence. The improvement in position at the time, however, is one which is effected for all distances of fixation.

If, instead of tenotomy of one or both externi, the internus of one or both eyes be advanced and caused to form a new attachment closer to the cornea (or shortened while retaining much the same line of insertion), we get, in the absence of converging power, a new position of functional rest, and the position thus got does not tend to be lost, unless the divergence previous to operation had not attained its full development. On the other hand, the position, though improved for distance, will not be at the same time corrected for nearer fixation.

The effect of strabismus operations is in most cases only a cosmetic one. There is seldom a restoration of binocular vision. Only, however, where binocular vision is restored is there any guarantee against recurrence. With proper optical correction and binocular fixation a suitable new relation between accommodation and convergence is gradually established. The cases in which this more complete cure of squint is obtained are mostly those in which, with equal, or fairly equal, vision in the two eyes the squint has developed not too early in life. Such a cure is, for instance, the all but constant result of tenotomy for the convergent squint of myopes. It is not so very uncommon, too, in the later-developed convergent squint of emmetropes and hypermetropes, especially if the squint has been accompanied by diplopia. Again, it is got by operation on divergent squints, when the vision of the deviating eye is sufficiently good on optical correction to excite fusion.

It is, first, the establishment of a more normal relation between the two axes by a suitable operation; and, second, the proper optical correction of the two eyes that render binocular fixation possible. In cases, too, in which the complete cure of the squint is effected, it is got for the most part as soon as these two conditions are complied with. The use of stereoscopic exercises, which are recommended by some writers, may possibly in some cases help. It is doubtful, however, if such exercises ever really lead to the establishment of binocular fixation, where this would not take place without their aid.

As to operations on the lateral recti, I shall only shortly refer to some of the principles which, in my opinion, should guide one. As regards convergent strabismus, it is not advisable to attempt the correction of anything but the permanent or habitual element of the squint. Cases should not therefore be operated on too young, as it is generally long before an accommodative over-convergence leads to such an inveterate habit of convergence that a large portion of the excessive convergence persists, notwithstanding optical correction, when, as is usually the case, such
correction is required. Owing to the fact that the age at which the squint first develops is not constant, and also because the habit of persistent squinting is more readily acquired in some than in others, no definite age can be fixed which is applicable to all cases. It is a good rule, and one from which I have only departed under exceptional circumstances, not to operate before the age of six. The younger the individual, too, the more careful should one be, especially in hypermetropes, not to make too full a correction by operation, but to leave something to disappear in the course of time by the use of suitable and properly-fitted glasses.

This precaution is not so necessary in alternating convergent squint with emmetropia and good vision in each eye, and not at all necessary in strabismus convergens myopicus. In the former, and even in cases otherwise similar, in which the refraction is hypermetropic, there is a good chance of binocular vision being resumed after operation. In the latter, this restoration of binocular vision is all but invariable. Every now and then one finds the result of a single tenotomy much greater than might be expected (the average effect is about 5 metre-angles). The cause is, then, that the retraction of the divided tendon has sufficiently reduced the over-convergence to allow fusion to do the rest that is required to render binocular vision possible. There remains, then, always more or less latent convergence, and this may, with advantage, be accurately corrected by further operation. It may even, without harm, be to some extent over-corrected. But as nearly accurate correction as is possible by tenotomy and a restraining suture, if necessary, should be aimed at.

Periodic squints, on the other hand, should not be interfered with. In these cases optical treatment is alone called for.

In the case of divergent squint, the full correction may be safely made by advancement of one or both interni in all cases in which there is no convergence left. Where there is fairly good convergence, care must be exercised, as it occasionally happens that even a tenotomy of one externus may give an over-correction.

Latent divergence need only be corrected by advancement of one or both interni when it is considerable (5 metre-angles or over). On no account should slight latent deviations, either divergent or convergent, be touched.

The fact that concomitant squint, whether convergent or divergent, is a binocular and not a unioocular defect, justifies the division over both eyes of the operative effect aimed at for its correction. Theoretically, in all cases, whatever the degree of the permanent squint, the most suitable treatment would be to divide the effect of operation equally over both eyes. This, I believe, is always done, and at the same sitting, by Panas. Besides the interest which attaches to the practice of so distinguished a surgeon, the modification which he has recently advocated seems to call for some special notice here.
Just before separating the scleral insertion of each internal rectus for concomitant convergent squint, Prof. Panas exerts a very considerable traction on the muscles, thereby forcibly stretching them and their aponeurotic attachments. The free section of the tendons and surrounding attachments which is then made often leads to an immediate over-correction, so that the patient may have a quite evident divergence. This does not remain permanent, but is succeeded after the lapse of a short time by parallelism, or even by a return of convergence, which may be sufficiently great to call for advancement of one or both external recti.

The result of this proceeding appears to have been eminently satisfactory at the hands of its author. To me it seems doubtful whether all operators would be able to acquire the knack of regulating the traction so as to avoid permanent over-correction in the case of the slighter deviations for which operative interference might be indicated. The principle on which the operation is founded is, that it appears advisable to stretch the muscles and loosen the aponeuroses in which the long continuance of the squint is supposed to have led to structural change.

If an operation is really successful in effecting a cure, it may seem of little consequence whether the principle on which it is based is right or wrong. From the foregoing exposition of the views which I hold as to the nature of a permanent convergent squint, it will be evident that I am unable to admit the correctness of the principle of Panas' operation. It appears to me that the explanation of the effect is simply this: that the powerful traction produces a temporary paresis of the muscles, so that their retraction is less forcible than it would otherwise be, or is altogether counteracted. It will depend, then, upon the time which elapses before their retractile power is restored, and the extent to which it returns during the period of consolidation of the tissues which reunite them to the sclera, how great is the effect. The later their recovery the less will be the effect as far as altered attachment goes. On the other hand, there must always be some effect. Leaving, however, this new method of operating out of consideration, it does not seem advisable practically to operate on both eyes, in cases where a single tenotomy or advancement (performed first on the squinting eye) is sufficient to rectify the position. When this is not sufficient, the next step should always be to perform the similar operation on the other eye, restricting its effect, if necessary, by suture. In this way we avoid too great an operative insufficiency. For instance, in convergent strabismus of the right eye, we may begin by tenotomy of its internus, and increase the effect, if necessary, by tenotomy of the left internus. This is preferable to further altering the position of the right eye by performing advancement of its externus, a proceeding which is sometimes advocated.
My own practice, and I believe that also which is mostly adopted in such a case, is (according to the extent of deviation to be corrected) to make the operations succeed each other as follows:—(1) Tenotomy of right internus, with or without restraining suture; (2) tenotomy of left internus, with or without suture; (3) advancement of right externus; (4) advancement of left externus.

No doubt there are some considerations which might seem to indicate that a similar order, beginning, however, with the advancements instead of the tenotomies, as recommended by Landolt, might be more desirable. In my opinion, they are more than counterbalanced by the greater precision and greater simplicity in every way of tenotomy, as compared with advancement.

There are many other points, as to choice of time for operation, extent of operative effect desirable, modifications indicated under conditions to which I have particularly referred, etc., all of which would call for notice in a full treatment of this subject. Moreover, inasmuch as on many such points there is room for difference of opinion, they hardly come within the legitimate scope of a lecture on a special subject delivered before this college.

APPENDICITIS: REMARKS AND CASES.

By RUTHERFORD MORISON, M.B., F.R.C.S.Eng. and Ed., Senior Assistant Surgeon, Royal Infirmary; Consulting Surgeon, Dental Hospital, Newcastle-on-Tyne.

A classification of cases of appendicitis, with our present limited knowledge, is difficult, and one that will satisfy all requirements, impossible. For surgical purposes, the best classification will be based on clinical characteristics, and the division I made and published elsewhere,¹ recognising three varieties, each of which I am in a position to illustrate by a series of cases, is the one I still adhere to.

I. Appendicitis with a localised and dry form of peritonitis. Such may be simple, recurrent, or relapsing.

II. Appendicitis with a localised collection of pus or inflammatory products. The fluid in these cases may be localised by adhesions or by the retrocaecal position of the appendix, and the condition may be acute or chronic.

III. Appendicitis with perforation into the general peritoneal cavity, and diffuse peritonitis.

¹ Northumberland and Durham Medical Journal, 1894, p. 135.