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Dr Craigie

*with the sincere regards of
The Author*

April 5/41.

ON THE
CURE OF STRABISMUS.

BY THOMAS ELLIOT,

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(From the Edinburgh Med. and Surg. Journal, No. 147.)

It is now upwards of five months since I forwarded to the editor of the *Lancet** an account of three cases, where the division of the internal rectus of the inverted eye failed in removing its squint. In these cases, the inversion was slightly diminished, but still confined to the eye that had been operated upon, while the patient was directed to look at an object placed before him, both eyes being uncovered.

But, in the same paper, I stated that I drew the following inferences from the cases above alluded to:—

1st, "That the strabismus could not be regarded as confined to one eye, since, when the sound eye was closed, the affected

* Vide *Lancet* of September 19, 1840.

one became straight, and could move in any direction; but, on raising the lid of the former, it was found inverted, though the position of the eyes was soon reversed again."

2d, "That the straight position of the sound eye appeared to me to depend on the state of its optic nerve, as vision was much more distinct with it when the squinting eye was closed, than *vice versa*."

3d, "That the convergence was mutual, as was seen by the inversion of the sound eye, when (after closing it) the eyelid was quickly raised."

And 4th, "That the return of the sound eye to the centre of the axis of the orbit must be the result of a muscular effort,—an effort sufficient to overcome the contraction of its undivided adductor, and made to accommodate its more distinct vision."

On reading over the opinions of different writers up to that time, I found that the affection had been regarded as confined to, because apparent in the inverted eye; and that, in consequence of such cases being looked upon as those of single squint, the operation or operations had been practised on one or more muscles of the same eye.

Thus, in a paper written by W. R. Ancrum, Esq. (vide *Lancet* of July 18, 1840,) in a summary of seventy-six operations, Mr Liston is mentioned as having "partially or completely divided the inferior rectus in about ten cases," where the patient possessed the power of turning the eye a little inwards and downwards.

Again, in an appendix to his *System of Practical Surgery*, Professor Lizars, (page 4), mentions the necessity of adopting the same practice in inveterate strabismus of one eye, where the division of the adductor and of its contiguous fibro-cellular tissue has failed in removing the eye's power of inversion.

In a paper, dated September 1, (vide *Lancet* of September 12), Mr Duffin, in alluding to Mr Liston's practice, says, "he does not by any means call in question the fact, that in some few instances it may be necessary to divide the inferior rectus, though, in the same paper, he tells us that he has always found, on careful examination, that a few tendinous bands remained unseparated; and on dividing them, the patient could no longer carry the pupil beyond the centre of the orbit towards the nasal canthus.

In another paper, dated September 16, (vide *Lancet* of September 26, 1840), Mr Duffin says, "When the adductor muscle is cut across, and the eye liberated completely from any adventitious or other attachment that may still retain it in its unnatural position, the abductor muscle, if in a healthy condition, immediately draws the pupil to the visual centre of the orbit;" thus attributing the remaining inversion, if any exist, to an unhealthy state of that muscle.

Other surgeons have been satisfied with having removed the greater part of the deformity, by the division of the adductor, and preferred allowing a squint to remain, to dividing more muscles of the same orbit, and substituting an unsightly prominence for the original squint, (vide case of C. Culbert, by Mr Lucas, in the numbers of the *Lancet* for April 18, May 2, and July 4, 1840.)

At the 16th page of the fourth edition of the Report of the Royal Westminster Ophthalmic Hospital, by C. W. G. Guthrie, Junior, dated September 18th, the following remarks are made on the causes and treatment of the remaining inversion in such cases. He says, "In some rare and very obstinate cases, the eye, almost immediately after the division of the muscle, returns to nearly its pristine state of obliquity, and these are, I presume, the kind of cases in which it has been thought necessary to divide, or to attempt to divide other muscles than the one originally intended to be operated upon; and although the division and separation of the muscle and its attachments, in the manner I have especially indicated, in every direction, until the outer or sclerotic coat is fully exposed to a considerable extent, enables us to succeed, in most instances, in effecting the object in view, it does not always do so, and, in a few cases, I have been obliged to desist, without bringing the eye to an exact central position; or I have found it a little turned inwards or outwards on the next, or some other succeeding morning. The remedy for the evil is to exercise the eye in a regular manner."

Mr Guthrie then says, "The cause of the difficulty I believe to be twofold. It may occur when the incision in the conjunctival membrane unites, in the first instance, by adhesion, which it will do in some cases when it is small, and the eye by turning at all towards its former oblique state, facilitates this process. I suspect, also, that the ball of the eye rests in its peculiar bed of membrane and fat, like a cast in a mould; and that when the eye is liberated from its squinting state, it does not remain in its new and partially unsupported condition, but gradually falls back into the mould of fat and membrane origi-

nally formed around it. I am led to apprehend, that the conjunctival membrane materially assists, from its general attachment to the eyelids, in maintaining the eye in its old position, from which it is, however, gradually drawn, in these cases, by the efforts of nature, assisted by art."

In a letter recently addressed to the Academy of Sciences, (vide *Lancet* of July 11, 1840), Mons. Guerin states, that the results of his operations "have been advantageous, but not immediately so. In one case only did the eye become quite straight soon after the operation; in the others, there was merely an amelioration, and this circumstance appears to me to be a natural consequence of the true origin of squinting."

The operation was mentioned in a late number of the *Provincial Medical and Surgical Journal*, as being equally unsuccessful in the hands of MM. Roux and Velpeau of Paris, who, however, did not recommend any plan for the removal of the remaining deformity, but regarded the operation as one that would shortly fall into disuse.

The opinions first advanced by myself, as will be seen on referring to the inferences quoted at the beginning of this paper, were, that in cases where there was an association in the movements of the eyes, the affection could not be regarded as confined to one eye; and that the circumstance of the same eye still continuing inverted, after the division of its adductor, simply depended on two things, viz. 1st, The mutual convergence not being removed; in other words, the parallelism of the optic axes not being restored; and 2d, The effort made by its superior and inferior recti to invert the eye already operated on, in order to accommodate the more distinct vision of the other or sound eye.

The practice of dividing the corresponding muscle of the straight or sound eye, as it is generally termed, (adopted in the month of August 1840), was undertaken in order to remove the remaining mutual convergence, and restore the parallelism of the eyes; and its satisfactory result was mentioned in the particulars of two cases given in the same paper, when the inversion was still confined to the eye that was first operated on.

It was adopted in preference to the division of the superior or inferior rectus, which, though it might restore the parallelism of the eyes, and remove the squint, would leave a prominence of the eye that was operated on, and limit its future movements; and in preference to the "exercising of the eye in a regular manner," which, though it might succeed in some instances, after a practice of weeks, or even months, in rendering the first eye the straight one, by improving its vision, would fail in restoring the parallelism of the eyes, and only

change the inversion from the one eye to the other, and never succeed even in that, in cases where the vision of the first eye could not be improved to the necessary degree by its change of position.

The best definition of strabismus that occurs to me is—that state of the eyes in which parallelism of the axes of the globes, in their different movements, no longer exists.*

Strabismus, as thus defined, may be conveniently divided, for practical purposes, into two great classes, viz. 1. Those cases in which there is no association whatever in the motions of the two eyes; or which only can be properly called cases of single squint; and, 2. Those cases in which there is an association in the motions of the eyes, where the position of one eye is always dependent on that of the other, and which may, with equal propriety, be called cases of double or mutual squint.

1ST CLASS. Cases of strabismus in which there is no association in the motions of the eyes, or cases of single squint.

The affected eye may be either fixedly inverted or everted. No change of position takes place in it on closing the other eye, or on directing the patient to look to one side or the other, when both eyes are open. In this class there is inversion or eversion of one eye, but no mutual convergence or divergence; and the deformity may be caused either by paralysis of the opposite muscle, or morbid adhesions.

In my own practice I have only met with one example of this class, which I shall briefly give.

John Williamson, aged 14; squint of ten years duration; cause, an injury of the head. On looking at an object placed before him, the position of the left eye was natural, while the inversion of the right was so great as to conceal the inner margin of the cornea. (Vide Plate I. Fig. 1. *a*.)

On closing the left eye by an effort, he could just expose the right cornea, which was drawn at the same time a little upwards or downwards, but not horizontally outwards. On looking to the right side, both eyes were much inverted. (Vide Fig. 1, *b*.) On looking to the left side, the eyes were parallel. (Vide. Fig. 1, *c*.)

At the urgent request of the patient, I divided, on September 8, the right adductor, though I gave him little hope of improvement. The result was a slight increase of power in moving the eye upwards and outwards, and downwards and out-

* In a practical treatise of this kind, it would be out of place to enter into a history of the causes of such loss of parallelism; nor is it my intention to take any notice of the temporary forms of it, incident to childhood, which may be removed without having recourse to operation.

wards. In a few days I tried the effects of electricity, through the medium of an acupuncture needle, introduced into the paralysed abductor, but without any apparent benefit.

In cases of this kind, it is scarcely necessary to say, that the operation, if undertaken, must be confined to the affected eye.

2D CLASS. Cases of strabismus in which there is an association in the movements of the eyes, where the position of one eye is always dependent on that of the other, and which may, with equal propriety, be called cases of double or mutual squint.

The two varieties of this class may be distinguished into,

1. Mutual Convergent Strabismus; and 2. Mutual Divergent Strabismus.

1st VARIETY.—*Mutual Convergent Strabismus*. a. Cases requiring the Division of one Adductor; and b. Cases requiring the Division of both Adductors.

a. Cases of *Mutual Convergent Strabismus* requiring the Division of one Adductor.—That these are not cases of single inversion, but in reality of double or mutual convergence, is proved at once by the experiment of closing the straight or sound eye, as it is generally termed, when the position of the eyes instantly becomes reversed.*

The affection, though slight, is undoubtedly participated in by both; and the effect of the operation on one eye, by removing the mutual convergence and restoring the parallelism, is visible on both eyes, since it not only removes the inversion of the eye whose adductor has been divided, but also the temporary inversion of the other or straight eye, which I have always seen in cases of this class, on resorting to the experiment of closing it and raising its lid, before the operation, as above-mentioned.

Whether the parallelism of the eyes will be restored by the division of one adductor, may be nearly always ascertained before-hand, by attending to the following circumstances.

1. If the mutual convergence be slight, as seen by a corresponding slight inversion of one eye, when the patient regards an object placed before him, both eyes being open.

2. If the power of abduction be free, which I believe is always the case where the inversion is principally caused by the adductor, and not much shared in by the superior and inferior recti.

* There are a few exceptions to this rule, viz. where the centre of the retina of the inverted eye is not the most sensible part. These will be described afterwards.

3. If the eyeball be large, as in that case it will be less acted on by the inner fibres of the superior and inferior recti, unless their tendons be large in a corresponding degree, so as to wrap over to the inner side of the ball, which I have not observed to be the case; and,

4. If the patient be young, or the squint of short duration, which diminish the probability of any great implication of the inner fibres of the superior and inferior recti.

There can be no doubt, that the parallelism of the eyes would be restored in these cases by the division of the adductor of either eye; but a preference must be given to that of the inverted or less clearly seeing eye, for the following reasons. Suppose the left eye to be usually inverted, or not used, on account of its indistinct vision. The section of the right adductor would, by restoring the parallelism of the eyes, remove the inversion of the left eye, and no squint would be perceptible on desiring the patient to look at an object placed before him; but the movements of the eyes, on looking to the right side, would be too free; while, on looking to the left side, on the contrary, the eversion of the left eye and inversion of the right would be limited in a corresponding degree, from the circumstance of the inner fibres of the superior and inferior recti of the former having been probably in some degree implicated or practised in the production of the almost constant inversion of that eye, so as to counteract more or less the abductor's action; and the same fibres of the other or right eye would probably offer but a feeble opposition to the right abductor, as the actions of the different muscles of that eye may be presumed to be normal, in consequence of its natural movements when both eyes are open, and it is made use of.

In cases, however, of this kind, where the sight of the eyes is equally distinct, and where, consequently, they are made use of alternately, the operation on either eye will answer equally well.

CASE I.—September 13. Elizabeth Dixon, aged 19. Inversion of the left eye since her birth; position and motions of each eye natural, when the opposite one is closed. When the left eye is straight, the right is seen inverted on raising its lid suddenly. When both eyes are open, and the patient looks before her, the inversion is always seen in the left. Its vision is indistinct; eyeballs large. A peculiar rotatory motion is constantly seen in both eyes, probably caused by an irregular action of the two oblique muscles.

Operation.—The patient being seated on a chair, a tablecloth was passed round her arms and body, and secured behind

its back. Her head was allowed to lean against the breast of an assistant, who at the same time raised the left upper eyelid by means of a speculum, the right eye having been previously bandaged. The patient was then desired to evert the eye as much as possible, the lower eyelid being at the same time depressed by the forefinger of my left hand. One blade of a pair of small curved eye-scissors was then passed through the conjunctiva, about three lines internal to the cornea, and a little below the inferior border of the adductor, and pushed gently upwards between the conjunctiva and sclerotic to the extent of four or five lines, when the former was divided. A blunt hook was next passed through the wound of the conjunctiva, its point being directed from below upwards between the tendon and the ball. A second blunt hook being introduced was pushed from before backwards, so as to separate completely the muscle from the ball, the first hook serving to steady the eye. On withdrawing the second hook, the tendon was brought gently forwards into view by means of the other, and divided by a pair of common angular scissors.

Result.—On removing the bandage, the eyes were observed to be quite parallel, though for a few seconds the left one appeared to be slightly everted.

There was a temporary relapse, which soon disappeared, and the eyes are now (February) quite parallel. The rotatory motion round the axis of the balls has also disappeared.

Remarks.—The mode of operating, as above described, was adopted in all my cases. By keeping the convexity of the curved scissors towards the cornea, and point consequently from it, the risk of injuring the ball is much lessened. I have never found it requisite to raise the conjunctiva by means of forceps or hooks, previous to making the necessary incision. By dividing that membrane near the cornea, the protrusion of cellular tissue is avoided, as well as the flow of a few drops of blood, which seldom appear till the tendon is cut through, thus enabling the operator to see clearly the different steps of the operation. Another advantage is the absence of all chance of permanently injuring the appearance of the *caruncula* and *plica semilunaris*. In some few cases it was found necessary to make use of a sharp hook, inserted into the sclerotic, to evert the eye to the necessary degree. Considerable difficulty is occasionally experienced, in consequence of the violent spasmodic contraction of the orbicularis, which forces the lining membrane of the upper eyelid downwards, and of the lower one upwards, so as completely to cover the eyeballs, in spite of all attempts to bring it into view by raising the former and depressing the

latter. With a little patience, however, and perseverance, this difficulty has been always overcome. In operating upon children, it is advisable to secure the legs and feet to the chair; and in case the eye be forcibly inverted, so as to conceal the white, it may be drawn outwards by inserting the sharp hook into the sclerotic external to the cornea.

The operation, as thus described, I have frequently performed in fifteen seconds; but it sometimes happens that the whole of the tendon is not raised on the blunt hook. In such cases, the hook must be reintroduced, and a careful search instituted, sweeping from below upwards, over the posterior and inner surface of the ball, and then drawing it forwards, and cutting through any slip of the tendon, or cellular tissue previously undivided.

If the patient is unable invert the eye beyond the centre of the orbit, the operation is complete as regards that eye; and this has been mentioned by different authors as the only test of the operation having been perfectly performed. In the great majority of cases, I have found, however, that the eye could be inverted considerably beyond that point, but not so as to conceal all the white of the eye, or the inner margin of the cornea, though the complete division of the tendon and cellular tissue connecting the muscle to the ball was proved in some of these cases by the clean exposure of the inner surface of the globe, and in all by a careful search with the blunt hook.

CASE II.—Sept. 14. Miss Huggins, aged 19. *Strabismus* congenital. On looking at an object placed before her, the left eye was inverted, and the right central or straight. On closing the latter, their position was reversed, as was seen by raising its lid. Power of abducting the left perfect; eyeballs large.

Operation.—The left adductor was separated and divided as described in the last case, and the cure was instant and perfect, both eyes being straight.

Remarks.—The patient, who was deaf and dumb, was made to evert the eye by signs. There was not the slightest appearance of blood till the tendon was divided. The power of inverting the eye after the operation was considerable. It is now five months since the operation was performed, and there has never been the slightest relapse.

CASE III.—Sept. 24. Robert Forster, aged 17. Squinted for eight years. On regarding objects in front of him, the right eye was always inverted, and the left straight. On closing the latter, their position was reversed, the left being seen for an

instantly inverted on suddenly raising its lid. Abduction of the right free, its cornea nebulous, and vision indistinct.—(Vide Pl. I. Fig. 2. *a*.)

Operation.—On dividing the right adductor, the eyes were instantly made parallel. (Fig. 2. *b*.) on looking forwards.

Remarks.—On looking to the right side, the left cornea was partly concealed, and a slight convergence was produced, (Fig 2. *c*.) On looking to the left side, a slight divergence was apparent, from the incomplete power of inversion of the right eye. (Fig. 2. *d*.) The patient was directed to practise looking to the left side, to prevent any recurrence of the mutual convergence, till the eyes were accustomed to their new association of movements. The cure is still perfect.

CASE IV.—Sept. 29. Miss W., aged 23. On looking at objects placed before her, the right eye is straight, and the left much inverted. When the right is closed, their position is instantly reversed, as seen by raising its lid. Perfect power of abduction of the left eye, but its vision very indistinct; eye-balls larger.

Operation.—The left adductor was separated and divided, and the eyes were instantly made parallel on looking forwards.

Remarks.—In three weeks there was a relapse, or renewal of the mutual convergence, and inversion of the left eye; but by practising looking to the right side, the squint has disappeared. In order to render the cure permanent, the patient is directed to bandage the right eye occasionally, so as to improve the vision of the left to the necessary degree.

The next case, and last of the kind which I shall give, is particularly interesting.

CASE V.—Oct. 10. James Wilson, aged 16. *Strabismus congenital*; small part of the white of the inverted eye seen internal to the cornea when the opposite eye is straight. One eye always inverted on looking forwards, but not always the same eye, as they are used alternately; vision of the right eye rather more distinct, though good in both. The inversion is often equally divided, when looking at objects very near the face. Power of abduction of both eyes perfect.—(Vide Plate I. Fig. 3. *a* and *b*.)

Operation.—The left adductor was separated and divided, and perfect parallelism instantly restored. (Fig. 3. *c*.)

Remarks.—This case would have been called one of double squint by the most careless observer. The patient made use of the eyes alternately; and the only reason for selecting the left eye for operation was the slight difference of distinct-

ness of vision. The motions of both eyes were free, and the alternate inversion was completely removed by the operation upon one eye.

The preceding cases will serve sufficiently well to illustrate this class, which, though single as regards the operation, are in reality cases of mutual convergence, as is proved both by the dependence of one eye on the other as to the position before the operation, and by the effect of the division of one adductor, not only on its own eye, but also on the other which is no longer inverted, when its lid is closed and raised.

The only difference between these cases, and those to be next described, is in the degree of convergence, which, if great, will require the division of the second principal converging muscle, or the adductor of the other eye, whether that convergence be indicated by a continued inversion of the same eye after the division of its adductor, or the inversion be apparent in the second or formerly straight eye.

Before entering into a description of the next variety, however, it may be as well to mention the causes of relapses in such as have been described, and the practice to be adopted for its removal.

If an occasional inversion of the less clearly sighted eye be seen on desiring the patient to regard an object placed before him, and if it be removed by closing the other eye, which in its turn does not become inverted, as seen by raising its lid, the fault must be attributed to the indistinct vision of the former eye, in consequence of which an effort is made by its superior and inferior recti to prevent its interference with the clear-sighted eye, and to avoid the confusion that would otherwise arise from regarding objects with eyes whose powers of vision were different. In such cases, the eye, whose adductor has not been divided, must be bandaged; and the other eye must be regularly practised, till the sight of both be made to correspond, when the cure will be complete and permanent.

It often happens, however, that a recurrence of the old evil, or mutual convergence, takes place, as indicated by the change of position of the eyes, on closing the sound or clear-seeing one, which may be seen slightly inverted on raising its lid. The relapse is to be here attributed to the continued influence of the former association of the motor nerves, which causes an increased action of the remaining converging muscles; and is to be removed, not by bandaging either eye, which has no effect on the convergence, but only substitutes the inversion of one eye for that of the other, but by directing the patient to look to that side which will cause even a slight divergence, viz. to

the left side, if the right adductor has been divided, and *vice versa*.—(Vide Plate 1. Fig. 2. *d*.)

The reason for this is obvious, as the power of inversion of one eye, after the division of its adductor, does not exist in a corresponding degree to that of eversion of the other; and the success of the practice is another strong proof of the proper distinction between single inversion, and mutual convergence indicated by inversion, as the plan just mentioned would be the most likely one possible to increase the original evil, were it really, as is too generally thought, confined to the inverted eye.

b. Cases of Mutual Convergent Strabismus requiring the division of both adductors.—In this division I include, 1st, those cases in which parallelism of the eyes is not perfectly restored by the division of the first adductor; and, 2d, those cases of relapse where the convergence cannot be removed by practice, whether it be apparent by a renewal of the inversion of the eye already operated on, or by a change of inversion from the first eye to the other, which inversion, as I have before mentioned, will be found to depend on the relative powers of vision of the eyes.

I shall first give a few examples where the inversion was removed from the eye whose adductor had been divided, and appeared in the other eye.

CASE I.—October 10. John Batey, aged 22. Strabismus of seven or eight years' duration. Inversion of the right eye so great as to conceal the inner half of the cornea, when the left eye is central, or looking at an object placed before the patient. He occasionally uses the right eye, when the left one is as much inverted as the right generally is. The sight of the left eye is most distinct. Abduction of neither quite perfect.

Operation.—The right adductor was separated and divided, when that eye instantly became straight, and a slighter inversion appeared in the other or left eye. In a few minutes the left adductor was separated and divided, and parallelism on looking forwards perfectly restored.

Remarks.—The similarity between this case and that of James Wilson before described must strike every one. In both, the eyes were used alternately; the only difference being in the degree of mutual convergence, indicated by the different degrees of inversion.

The circumstance, in this case, of the inversion leaving the right eye and settling in the left, after the first operation, is accounted for by the tolerably distinct vision of the former, which prevented the necessity of any effort being made to accommodate the other eye.

CASE II. October 13. Robert Wilson, aged 12½.—On looking at an object in front of him, the right eye was straight, and the left eye so much inverted as to conceal all the white internal to the cornea. When the right eye was closed, their position was reversed. The left eye could scarcely be everted beyond the centre of the orbit. Its vision was indistinct.

Operation.—The left adductor was separated and divided, and the remaining convergence was indicated by an inversion, sometimes of the right eye, at other times of the left.

The right adductor was then divided, and the cure made perfect. There has never been the slightest relapse.

Remarks.—The probability of a second operation being required, was indicated in this case by the limited power of abduction. The change of, or rather alternate inversion seen after the division of the first adductor, depended on the object looked at. If small, the right eye continued straight; if large, and such as could be seen distinctly by even the left, the right eye in its turn was inverted, as less effort was of course required for that position of the eyes.

CASE III. October 13. Ann Smith, aged 9.—Squint of five years' duration. On looking at an object placed before her, one eye is always straight, and the other so much inverted as to conceal the white, internal to the cornea. The eyes are used alternately, though the right is most frequently so, as its vision is rather more distinct than that of the left.

Operation.—The left adductor was separated and divided, when that eye became straight, and the slightest possible inversion appeared in the other. The patient was directed to practise regularly as before explained; but the convergence, indicated by an increasing inversion of the right eye, continued to gain ground.

As the left eye was rendered rather prominent by the operation, the patient agreed to submit to the division of the second adductor, which was done on the 30th of October 1840. The instant the muscle was divided, the eyes were made perfectly parallel, and corresponded exactly in appearance. There has been no second relapse.

Remarks.—The relapse that supervened on the first operation could only be attributed to the influence of the ill-directed nervous association that regulated the motions of the eyes, and caused an increased action in the remaining converging muscles, and inversion of the clearer-sighted eye.

CASE IV. October 16. Mrs Liddell, aged 31.—Squinted since childhood. One eye always much inverted on looking forwards; generally the left one. When the right is straight,

the inner margin of the left cornea is concealed. Abduction of the latter nearly perfect.

Operation.—I separated and divided the left adductor, and the eye was still slightly inverted. On searching with the blunt hook, some fine cellular tissue was drawn forwards and divided. A slight inversion then appeared to settle in the right eye. The right adductor was then divided, and parallelism instantly restored; the eyes at the same time being rendered equally full. There has been no relapse; and the sight, as in all the previous cases, has been much improved.

CASE V. October 19. Mrs Gaddes, aged 33.—Squint of twenty-nine years' duration. Alternate inversion of the eyes. Sight and size of pupils correspond. If the right eye was directed straight upon an object placed before the patient, two-thirds of the left cornea were buried in the inner canthus; and on directing the patient to close the eyes for an instant and re-open them, their position was exactly reversed. This experiment was frequently tried, and always with the same result. In short, no difference could be detected between the eyes, as they seemed to relieve each other by acting alternately. (Plate II. Fig. 1. *a* and *b*.) The eyeballs were large, and their powers of abduction nearly perfect.

Operation.—The right adductor was separated, and its tendon divided. The right eye was still occasionally inverted. On reintroducing the blunt hook, a slip of the tendon was found undivided, and cut through. The inversion, though in a much slighter degree than before the operation, was then seen to settle in the left eye. (Vide. Fig. 1, *c*. Plate II.) The left adductor was next separated and divided, and on uncovering the other eye, both were seen perfectly straight. There has never been the slightest relapse up to this time. (Fig. 1, *d*.)

Remarks.—This was the most beautiful case of mutual convergence and alternate inversion that I have seen. The effect of the division of the right adductor was seen, not only on its own eye, but also on the left one, as seen by its diminished inversion. That both adductors would require division was evident before the operation, from the very great alternate inversion, and the duration of the squint. And that no relapse would take place was rendered probable, 1st, from the facility of regarding objects with both eyes, as their vision was equally distinct; and, 2dly, from the difficulty that the superior and inferior recti would experience in causing that relapse, in obedience to the long-continued and ill directed association of the motor nerves, on account of the large size of the eyeballs, which, as before-mentioned, are little acted on by those muscles, unless their tendons are large in a corresponding degree, so as to wrap over to their inner sides.

CASE VI. Oct. 26.—Mrs Mary Cullen, aged 40. Squint of thirty-eight years' duration; right eye generally inverted; the inner half of its cornea being concealed when the left is straight. Their position is reversed when the right is made use of. Abduction of each eye nearly perfect.

Operation.—Separated and divided the right adductor tendon, when a slight inversion appeared to settle in the left eye. The left adductor tendon was then merely divided, without detaching the muscle from the ball, for fear of producing eversion, and parallelism was perfectly restored. There has been no relapse.

These cases will be found in every respect the most satisfactory, as a relapse seldom supervenes; and when it does, is easily removed by practice.

The patient must be directed to practise looking to either side, if a slight tendency to convergence be apparent, till the eyes are accustomed to their new association of movements, or association of parallelism. By this side practice, a slight temporary divergence is even produced, which is caused, not, as has been stated, by an undue action of the abductor, but by the inability of the other eye to invert in proportion, from the division of its adductor. This, however, soon disappears, and the eyes correspond perfectly both in appearance and movements. On dividing the second adductor, I have occasionally seen a slight divergence produced, even on looking forwards; but this has always been removed in the course of a few days. The patient in such a case must be directed to look forwards at objects, and avoid side-practice.

Cases are recorded, and I know of two in this neighbourhood, where the divergence produced was great, and could not be removed by practice. In such circumstances the division of either abductor will answer equally well in restoring the parallelism. But where the divergence has been produced by the division of only one adductor, I should select the other eye for the division of the abductor, in order to render them equally prominent. I may mention, however, that such an unfortunate result has never taken place in my own practice, and I believe it may always be avoided by first merely dividing the tendon, if the convergence be slight, and then, in case it be not removed, by reintroducing the blunt hook, and separating the muscle from the ball to the necessary extent.

I shall now give a few examples of the last variety of cases belonging to this division, viz. those where a still continued convergence, after the division of the adductor of the inverted eye, is indicated by a continued inversion of the same eye.

This continued squint or inversion, which is still confined

to the eye whose adductor has been divided, when both eyes are uncovered, and the patient looking before him, has been attributed, (as will be seen by referring to the various quotations at the beginning of this paper,) to very different causes, such as an undue contraction of the inner fibres of the superior or inferior rectus, an unhealthy state of the external rectus or abductor, healing of the wound of the conjunctiva by first intention, the eyeball returning to its bed of membrane and fat, like a cast in a mould, an imperfect division of the adductor and its cellular tissue, &c. &c., and the practice adopted for its removal has varied according to the views entertained by those writers as to the reasons of the continued inclination inwards of the eye.

The remaining inversion is no doubt effected by the contraction of the inner fibres of the superior and inferior rectus; but, as I stated in the *Lancet* of September 19, this contraction is made to accommodate the more distinct vision of the other eye, and is not the result of a shortening of those fibres, as is at once proved by the reversed position of the eyes, when the straight or sound one is closed.

An unhealthy state of the abductor, contraction of the conjunctiva, &c. are also disproved by the same simple experiment.

The cause of the evil is the non-removal of the mutual convergence, the continuance of which is to be attributed to the ill-directed association of the motific nerves; and the continued inversion of the eye operated on, depends, as before stated, on its very indistinct vision, which renders it comparatively unfit for use.

Were the affection confined to the inverted eye, and the inclination inwards attributable merely to a temporary effort made by its superior and inferior recti to prevent confusion of vision, the practice of bandaging the sound or straight eye would be all that was required. But, as already mentioned, the only effect of that practice in these cases is reversing the position of the eyes, so that the utmost to be gained by its adoption would be a permanent change of inversion from one eye to the other by producing a change in their relative powers of vision.

I trust the distinction thus made between inversion and convergence will be clearly understood. The former depends on the eye's comparatively indistinct vision; the latter, on an abnormal association of the nerves of motion. That the fault lies in the nerves which regulate the movements of the muscles, and not in the muscles themselves, is evident, 1st, from the natural position of each eye when the opposite one is closed; and, 2dly, from the circumstance that a similar action is frequently adopted by the remaining muscles or superior and

inferior recti, causing a temporary relapse, to remove which a side-practice of longer or shorter time will be often found necessary, till the eyes be accustomed to their new association or parallelism of movements.

It is on account of the difficulty of removing the converging tendency that I now invariably adopt the practice of dividing the second adductor, when an inversion, however slight, is seen in either eye on looking forwards, after the division of the first adductor; not to mention the improvement in the appearance of the eyes by rendering them symmetrical.

Hoping that these remarks will render the principles sufficiently clear, on which the practice of dividing the corresponding muscle of the straight or sound eye, as it has been frequently termed, was founded,* I shall proceed to give a few examples in illustration, begging leave to refer the reader to my paper in the *Lancet* of September 19, for the particulars of the successful results of the same practice in the two first cases of the kind in which I had an opportunity of adopting it, in both of which there was a temporary relapse, which was completely removed by side-practice. In the second of these the relapse could only be attributed to the motor nerves, and not at all to the nerves of sight or confusion of vision, as the inverted eye was affected with nebula, which rendered it utterly useless. Both cases are permanently cured; at least it may be presumed so, as there has been no convergence for several months.

CASE III.—Sept. 14. Miss Rennison, aged 13. Squint of seven years' duration. Inversion of the left eye so great, as nearly to conceal all the white internal to the cornea, when the right eye was straight, and the patient looking at an object placed before her. On closing the right eye, their position was reversed, but on raising its lid, the left eye instantly turned in again. Right eye always made use of, as the vision of the left was very indistinct; abduction good; eyeballs small.

Operation.—The left adductor was separated and divided. On uncovering the right eye, a slight inversion was still apparent in the left. On searching carefully with the blunt hook, it was found that all had been divided. The adductor of the right and straight eye was then divided, which completely removed the remaining inversion of the left one, and restored the parallelism, at the same time rendering them equally prominent.

* A practice that has been regarded by one writer as "too absurd to notice," (Vide paper by Mr Clay, in *Lancet* of January 2, 1841;) and as a novelty, when adopted in *strabismus divergens*, calculated to produce incurable convergent strabismus. (Vide paper by Mr Duffin, in *Lancet* of November 7, 1840).

Remarks.—The continued inversion of the left eye in this case evidently depended on its indistinct vision, as it was nearly useless. The operation on the second and straight eye was undertaken in order to remove the mutual convergence, by depriving the motor nerves of their converging power. The power of inversion of both eyes after the operation was nearly natural, which might have been expected from the small size of the eyeballs.

In a few days, there was a slight occasional inversion of the left eye, evidently made to prevent confusion of vision, as it was removed by closing the other eye, which did not become inverted in turn, as seen on raising its lid, when both eyes remained straight. By bandaging the right eye for two or three weeks, the vision of the left was much improved, and parallelism restored.

CASE IV. September 20.—John Dixon, aged 6. Very great inversion, and indistinct vision of left eye. Position of the eyes reversed on closing the right or straight one. Abduction of both good. Eyeballs large.

Operation.—The left adductor was separated and divided. On uncovering the right eye, the left eye again turned in. A careful search with the blunt hook showed that all had been divided. On closing the right eye, and raising its lid, it was seen slightly inverted, though only for an instant.

As the continued inversion of the left eye was thus proved to be the result, not of a voluntary effort on the part of its muscles, but of the non-removal of the mutual convergence, the adductor of the right, and still straight eye was divided, without separating the muscle from the ball.

Result.—Both eyes were perfectly straight on looking forwards.

Remarks.—Both eyes required operation in this case, on account of the great converging power, indicated by the great inversion of the left eye. As the eyeballs were large, it is probable that the tendons of the superior and inferior recti were large in a corresponding degree. The case is an extremely beautiful one, and there has never been any renewal of the mutual convergence.

CASE V.—September 27, (Vide Plate II. Fig. 2, *a*.)—Mr Irving, aged 34. Squint of twenty-eight years' duration. Inversion of the right eye so great as to conceal the inner half of its cornea, when the left is straight. Right eye never made use of, as its vision is very indistinct. On closing the left, the position of the eyes was instantly reversed.

Operation.—The right adductor was separated and divided. On uncovering the left eye, the right one was still as much in-

verted as to conceal all the white internal to the cornea. On searching with the blunt hook, the eyeball's inner surface was cleanly exposed.—(Vide Fig. 2, *b*.)

After a little persuasion, the patient submitted to the operation on the left eye, in which no squint could ever be detected, except on closing and reopening it, and then only for a second or two.

Result.—Perfect parallelism and removal of the great continued inversion of the right eye.—(Fig. 2, *c* and *d*.)

Remarks.—For three days, the eyes remained straight, but at the end of that time, the right eye became slightly inverted again. In consequence of the patient's being obliged to attend to his business, (that of a barber), he was unable to bandage the left eye, on account of the bad sight of the right, which rendered it useless. The necessity of looking almost constantly forwards tended also to increase the convergence and inversion of the right eye, which at length became so great as nearly to conceal all the white internal to the cornea when the left eye was straight.

The patient, though anxious to undergo another operation, was induced to practise looking to the right side whenever he had an opportunity, and the result has been highly advantageous. When he now looks to either side, the eyes are parallel; and on looking straight forwards, they are frequently perfectly natural, though an occasional inversion, or rather cast, is seen in the right eye. I have little doubt but that this cast even will ultimately disappear, as the time devoted to side-practice has been short, in consequence of his almost constant occupation, which tends much to increase or renew the deformity.

CASE VI.—September 28th. Mary Scott, aged 22. Inversion of the right eye so great as to conceal the inner margin of the cornea when the left eye is straight. Sight of the right indistinct. On closing the left eye, and desiring her to look at an object placed before her with the right, the latter remained inverted, and looked sideways at it, as the part of the retina corresponding with the foramen of Soemmering was not made use of. On moving the object looked at towards the right side, the eye became straight or central, and on then raising the left lid, the usual position of the eyes was seen reversed for a few seconds.

Operation.—The right adductor was separated and divided, but a decided inversion still appeared in the same eye, and entirely confined to it when both eyes were open, and the patient looking at an object placed before her. That the muscle was completely detached from the ball was ascertained by

a careful search with the blunt hook. The adductor of the left and straight or sound eye was then divided, and the result was not only the removal of the inversion, but even the production of a slight eversion of the right eye.

Remarks.—The slight eversion appeared in the right or quondam inverted eye, as might have been expected from its indistinct vision, and showed the effect of the division of the left adductor in a remarkably distinct manner. Considerable difficulty has been experienced in this case in forming an association of parallelism in the different movements, as the eversion disappeared, and was followed by an inversion of the same eye. This has been overcome, however, by side-practice, as bandaging the left eye would have been worse than useless, on account of the insensibility of the centre of the right retina, and the constant inversion of that eye, on looking at an object placed before it. It is now upwards of four months since the operation, and on standing opposite the patient, and desiring her to look at you when both eyes are open, they are perfectly straight. On closing the left, the right eye instantly becomes inverted.

The parallelism is maintained in this case by the association of the nerves of motion, and not of sight, as the left eye alone is made use of when both are open.

CASE VII.—October 10th. Joseph Colthwaite, aged 28. Left eye never used, and the inner half of its cornea concealed, when the right is straight, and the patient looking before him. On closing and reopening the right or straight eye, their position is seen reversed for a few seconds. Can abduct neither eye beyond the centre of the orbit. Vision of the left eye very indistinct.

Operation.—Separated and divided the left adductor. On uncovering the right eye, the left again turned in so much as to conceal the white, the right eye remaining perfectly straight. The right adductor was then separated and divided, and parallelism was restored as nearly as possible, though not perfectly.

Remarks.—In a few days, the cure was made quite perfect by side-practice, and there has been no relapse. The eyes now correspond both in appearance and powers of vision.

CASE VIII.—Oct. 14. Mary Sheppard, aged 18. Squint of fifteen years' duration; inner third of the left cornea concealed when the right eye is straight, or the patient looking before her. On closing the right eye, their position is reversed, but on opening it, the left instantly turns in again. Vision of the left very indistinct. Power of abduction nearly perfect.

Operation.—The left adductor was separated and divided, but an inversion still remained in the same eye. A careful search with the blunt-hook proved the complete separation and division of the muscle and cellular tissue. The adductor of the right and straight eye was then divided, which completely removed the inversion of the left, and restored the parallelism.

Remarks.—A slight recurrence of the mutual convergence was soon removed by side-practice, and both eyes have since remained perfectly straight.

CASE IX.—Oct. 22. Mr Gavin Gray, aged 23. Squint of eleven years. Inner margin of the right cornea concealed, when the patient looks before him, and the left eye is straight. Position reversed on closing the latter. Right eye never made use of, and its vision very indistinct; eyeballs large, and abduction of neither quite perfect.

Operation.—The right adductor was separated and divided, but the same eye still remained inverted. On searching with the blunt-hook, a little cellular tissue was taken up and divided. The inversion still continued. The adductor of the left and straight eye was then separated and divided, which restored the parallelism, and removed the inversion of the right eye, though the eyes appeared unduly prominent.

Remarks.—There has been no relapse. This is probably to be accounted for by the large size of the eyeballs, as the patient's business, that of a printer, was calculated to cause a recurrence of the mutual convergence. The cure is perfect, and appearance of the eyes quite natural. The vision of both also corresponds.

CASE X.—Oct. 28. John Morgan, aged 20. Squint of eighteen years' duration. Inner margin of the right cornea concealed when the left is straight. Sight of right eye very indistinct. On closing the left eye, the right is not directed straight upon an object placed before it, but remains inverted. On moving the object to the right side, the eye becomes straight. By raising the lid of the other, their position is then seen to be reversed; abduction good; eyeballs very small.

Operation.—The right adductor was separated and divided, and the eyeball seen completely exposed. The same eye still continued so much inverted, as to conceal all its white internal to the cornea. The left adductor was then divided and separated, and parallelism restored, though occasionally a slight cast appeared in the right eye.

Remarks.—As was expected, much difficulty has been experienced in the cure of the relapse. The change of seat of sensibility of the right retina, and small size of the eyeballs, will

at once account for this; the former rendering the inverted position of that eye most favourable for its use; the latter accounting for the great converging power of the inner fibres of the superior and inferior recti, which could invert the eyes by turns in a natural degree, immediately after the operation.

A few days ago, on examining the case, I found both eyes straight, but on closing the left, the right turned in as formerly, showing the association to be merely that of motion, not of sight.

CASE XI. — Nov. 29. Matthew Robinson, aged 27. Squinted since childhood. On looking before him, the inner margin of the left cornea is concealed, while the right eye is straight. On closing the latter, their position becomes reversed. Sight of the left eye very indistinct, and a white speck seen in the lens. Abduction good; eyeballs small.

Operation.—The left adductor was separated and divided, but the eye still turned in. A careful search was made with the blunt hook, but it was found that all had been divided.

The patient was then urged to have the same operation performed on the other eye, but this he resolutely refused to submit to, as nothing could induce him to believe that it was at all affected. I thought it better to leave the eye inverted, than divide more muscles of the same orbit, and increase the prominence, which already existed after the division of the first adductor, though the patient was willing to undergo more operations on the squinting eye.

Side-practice, of course, proved in this case insufficient to remove the mutual convergence, and the eye still continues inverted.

CASE XII.—Dec. 2. Miss Jane Robinson, aged 21. Squint of sixteen years' duration. On looking at an object in front of her, the inner margin of the left cornea was concealed, while the right eye was straight. Position reversed on closing the latter. Power of abduction very imperfect; vision much impaired, as the left cornea is nebulous.

Operation.—The left adductor was separated and divided. The patient could then abduct the eye perfectly. On uncovering the right eye, the left again turned in. As in all the previous cases a careful search was made with the blunt hook, but all was found divided. The adductor of the straight eye was then divided, and the inversion of the left completely removed. The cure was perfect.

Remarks.—A slight relapse was removed in a few days by side-practice. In this case, as in a few others of the kind on which I have operated, viz. where the cornea of the inverted eye was affected with nebula, the vision of the good eye was

much improved. This can only be accounted for by the steadiness of its position, since it no longer requires any effort to prevent its inversion, the mutual convergence having been removed.

It would be useless to offer more examples of this variety of strabismus,—indeed, I fear they are already too numerous. But I wish to impress on the reader, 1. that the division of the adductor of the inverted eye very often fails in removing its squint; and 2. that its continued inversion may be removed instantly by a division of the corresponding muscle of the straight and clear-seeing eye, provided the convergence be mutual, as ascertained beforehand by their association of movements.

I am anxious to lay the more stress upon this, as I regret to learn that such eminent surgeons as MM. Roux and Velpeau regard the operation itself as unsatisfactory, and one that must soon be abandoned; an opinion entertained also by some surgeons of this country, who have operated on a number of cases, but confined their operation or operations to the inverted eye.

The continued inversion, as before-mentioned, depends on the eye's inutility for the purposes of vision; and the surgeon must direct his attention, not to the removal of that inversion by dividing more muscles of the same eye, but to the removal of the mutual convergence, in causing which the straight or non-squinting eye is equally implicated.

As the convergence, though not the inversion, is always shared by both eyes, so ought the operation to be, provided parallelism be not restored by the division of one adductor.

And in such cases, I would insist upon the division of both adductors at the same sitting, in order to remove the converging tendency as soon as possible, otherwise the habit assumed by the superior and inferior recti may be so powerful as to require operation on them also. *

In all the cases where I have divided both adductors at the same sitting, the squint has been removed. In most of them the eyes have been instantly made parallel on looking forwards, and equally so in a few weeks on looking to either side. In a few a slight divergence has been caused, accompanied by diplopia; but this has always disappeared in a few days. In two

* In one case only has the division of both adductors failed in removing the squint, and I can only attribute it to the habit acquired by the superior and inferior recti, as an interval of three weeks passed over before the second operation was had recourse to. A search was made at the same time to ascertain if the first adductor had formed a new attachment to the ball, but the latter was found quite clear. Though the person still squints, the effect of the division of the adductor of the straight eye was greater on the inverted one, than the division of its own adductor.

or three an occasional cast has been observed immediately after the division of both adductors, when an oscillation of the eye that was formerly inverted was seen, caused by the alternate action of the abductor, and superior and inferior recti, which soon disappeared when the eyes became accustomed to their new association.

Before proceeding to the description of *strabismus divergens*, I may mention that I have on several occasions, where the squint had been removed by the division of the first adductor, had recourse to the same operation on the second eye, in order to render them equally prominent, and make them correspond in appearance. The second operation in this case must be conducted with extreme care, so as merely to divide the tendon near its insertion, without separating its cellular attachments to the ball, for fear of producing eversion.

CLASS II. 2d VARIETY. *Mutual Divergent Strabismus*.—Like the last, mutual divergent strabismus may be classified under two heads, viz.—

a. Cases requiring the division of one abductor. b. Cases requiring the division of both abductors.

a. Cases of Mutual Divergent Strabismus requiring the division of one abductor.—Like the cases of mutual convergence, the closing of either eye makes the other straight; and on raising the lid of the closed one it will be seen everted.

When the mutual divergence is slight, as indicated either by the constant slight eversion of the same eye when the patient looks forwards with both eyes open, or by the alternate slight eversion of the eyes, when their powers of vision correspond or nearly so, the division of one abductor will be all that is required; and, for the reasons before given, I would select the usually everted eye, or that one whose vision is most indistinct, for operation.

Where, however, the eversion has resulted from the division of one adductor, and cannot be removed by practice, I would give a preference to the other or straight eye, in order to render them equally prominent.

If the eyes be made use of alternately, parallelism will be restored by the division of either abductor.

b. Cases of Mutual Divergent Strabismus requiring the division of both abductors.—The particulars of the first case of this kind that I operated upon (on October 6, 1840,) were given at sufficient length in the *Lancet* of October 31. The second case was alluded to in the same paper, and will serve to illustrate this class.

CASE. October 10. Plate II. Fig. 3. *a.* Mr Wilson, aged 41.—Squint of thirty years' duration. On looking forwards,

the right eye is always straight, and the left so much everted as to expose scarcely a line of the albuginea external to the cornea. The eversion is always seen in the left eye, its vision being so indistinct as to render it useless. On closing the right eye the left becomes straight; and on raising the lid of the former, it is seen everted for an instant, when their position becomes reversed. Power of inversion good.

Operation.—The left abductor was separated and divided, and was found scarcely thicker than a crow-quill. A slight eversion was still apparent in the same eye. On searching with the blunt hook, it was found that all had been divided. (Fig. 3, *b*.) After a little explanation, the patient readily submitted to the second operation.

The abductor of the straight or sound eye was then divided, which, by removing the diverging power,* and restoring the parallelism, removed also the continued eversion of the left eye. (Fig. 3, *c*. and *d*.) The cure was perfect, and the power of abducting each eye existed in the natural degree, immediately after the operation.

Remarks.—In a few days the left eye again appeared slightly everted, and on closing and reopening the other, the affection was proved to be mutual. The patient was directed to practise looking forwards at very near and small objects. By this means, a slight temporary convergence was produced, which was soon removed by the patient's judicious management. The eyes have now been perfectly straight for upwards of three months, and the vision of both now corresponds.

The other cases of *strabismus divergens*, on which I have operated, resemble this one so closely that it would be merely a repetition to lay them before the reader. In all of them, the vision of the everted eye was very indistinct, and consequently the inclination outwards after the first operation was still confined to it; and in all, the division of the corresponding muscle of the straight eye restored the parallelism.

The relapse that takes place in these cases requires considerable practice to remove, and in one of my cases a slight cast outwards still remains, particularly on looking upwards.

In none of them has there been any granulation, and this may probably be attributed to the horizontal incision of the conjunctiva, which does not leave the sclerotic so much exposed, the excrescence appearing to shoot from its surface.

When a granulation appears, it may be touched, if small, with nitrate of silver. If it be large, however, I wait till the

* I make use of the word power, for the diverging tendency or influence of the motor nerves exists even during the parallelism obtained by the operation, and generally shows itself by causing a temporary relapse.

wound of the conjunctiva contracts around, and partly strangulates it. The narrow neck is then snipped through with a pair of scissors, close to the bell, and the bleeding surface touched with caustic, which is generally found sufficient to prevent its renewal.

In conclusion, I may be allowed to offer a few remarks on the classification generally adopted in cases of strabismus.

Mr Lucas (and in quoting his opinions I believe I lay before the reader those generally entertained) divides them into,

I. *Convergent*, II. *Divergent*, and III. *Anomalous*.—"Convergent strabismus," he tells us, "may affect one or both eyes;" and his mode of ascertaining it is by holding his hand obliquely in front of the straight or better-sighted eye, and "desiring the patient to exercise the other." If, when the usually inverted eye becomes straight, the other retreats into the inner canthus, the case is one of double convergent strabismus, and will require the division of both adductors; "but if the contrary occurs, if both eyes are at this period straight, or even if the covered one has but a slight inclination inwards, the case is one of single convergent strabismus, and the inner rectus of one eye only will require to be divided." (Vide p. 48 and 49 of Mr Lucas's treatise on Squinting.)

Now I may again mention, that in all the cases I have seen, where the eyes were free in their movements, whether requiring the division of one adductor or both, the convergence was mutual, and the only effect of closing or shading one eye was substituting its inversion for that of the other. The convergence was neither removed by it, nor the eyes made parallel.

If parallelism can be temporarily induced by covering the clear-sighted eye, it ought to be bandaged till the sight of both is made to correspond, when a permanent cure, without having had recourse to operation, would be the result. Such a case I have not yet seen, and it could only be termed one of single inversion, not single convergence.

In cases requiring the division of both adductors, the mutual convergence is also shared by both eyes, and differs only in degree from those requiring the division of one.

In these cases, for the reasons already given, the inversion may be always seen in the same eye, when both are open, though the convergence is always shared by both eyes.

I have never yet seen the division of both adductors, when it was found necessary, fail in removing the squint, if both operations were undertaken at the same sitting. The relapse that generally supervenes has been perfectly removed in nearly all these cases by side-practice; and where the vision of the eyes can be made to correspond, the cure will probably be perma-

ment, though a sufficient length of time has not yet elapsed to render it certain.

The occasional cast that is sometimes seen, weeks or even months after the operation, may be always, I believe, attributed to one of two causes, viz. either a continuance of the converging tendency, in consequence of the necessary degree of side-practice not having been resorted to with sufficient perseverance on the part of the patient, or the difficulty of making the sight of the eyes correspond.

In the former case, I believe the cure may be made complete by the patient's good management.

In the latter, the propriety of removing the occasional squint by further operation is questionable, as that object can only be gained by permanently destroying the eye's power of inversion, and consequently depriving both of their beautifully associated lateral movements.

The preceding remarks and cases will show that much requires to be done after the operation. The converging or diverging tendency, (according to the kind of strabismus,) that exists during the parallelism obtained by operation, shows its effects in most cases on the remaining muscles by causing a relapse; and close observation on the part of the surgeon, with well-directed and persevering practice on the part of the patient, will be found requisite in order to render the cure complete.

With attention to these, however, the operation will not only be found one of the most beautiful, but also one of the most successful that was ever introduced into surgery.

Carlisle, 1841.

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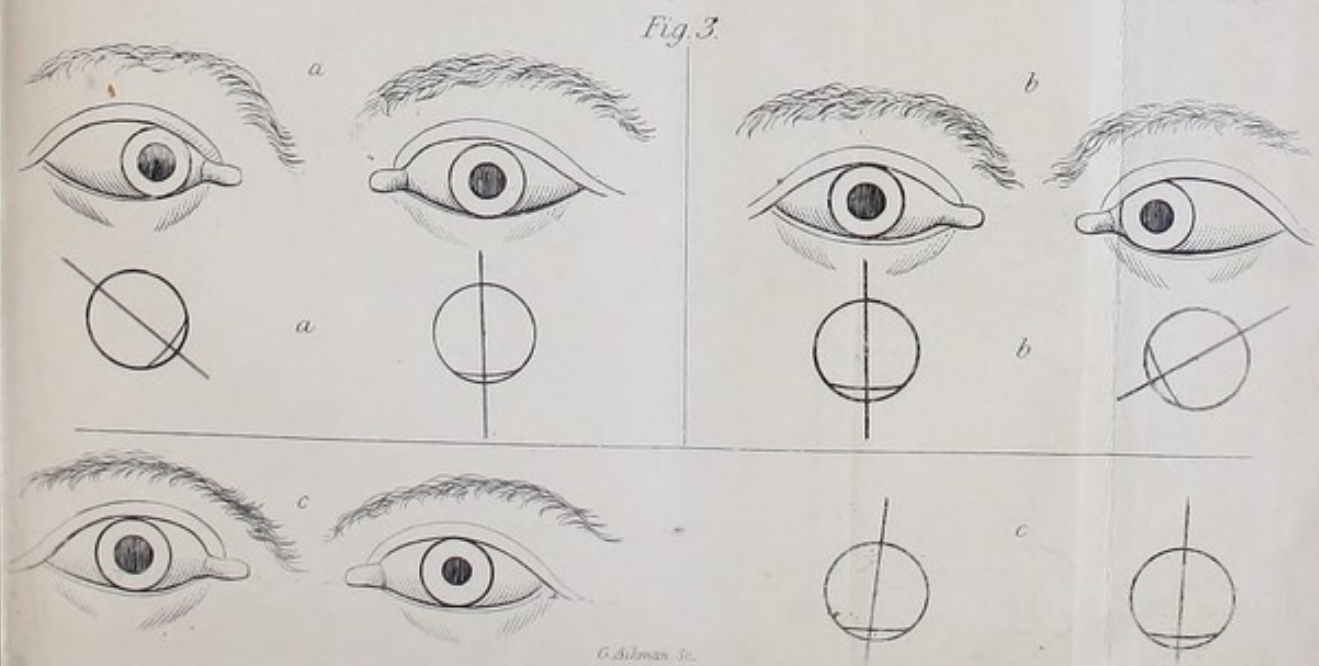
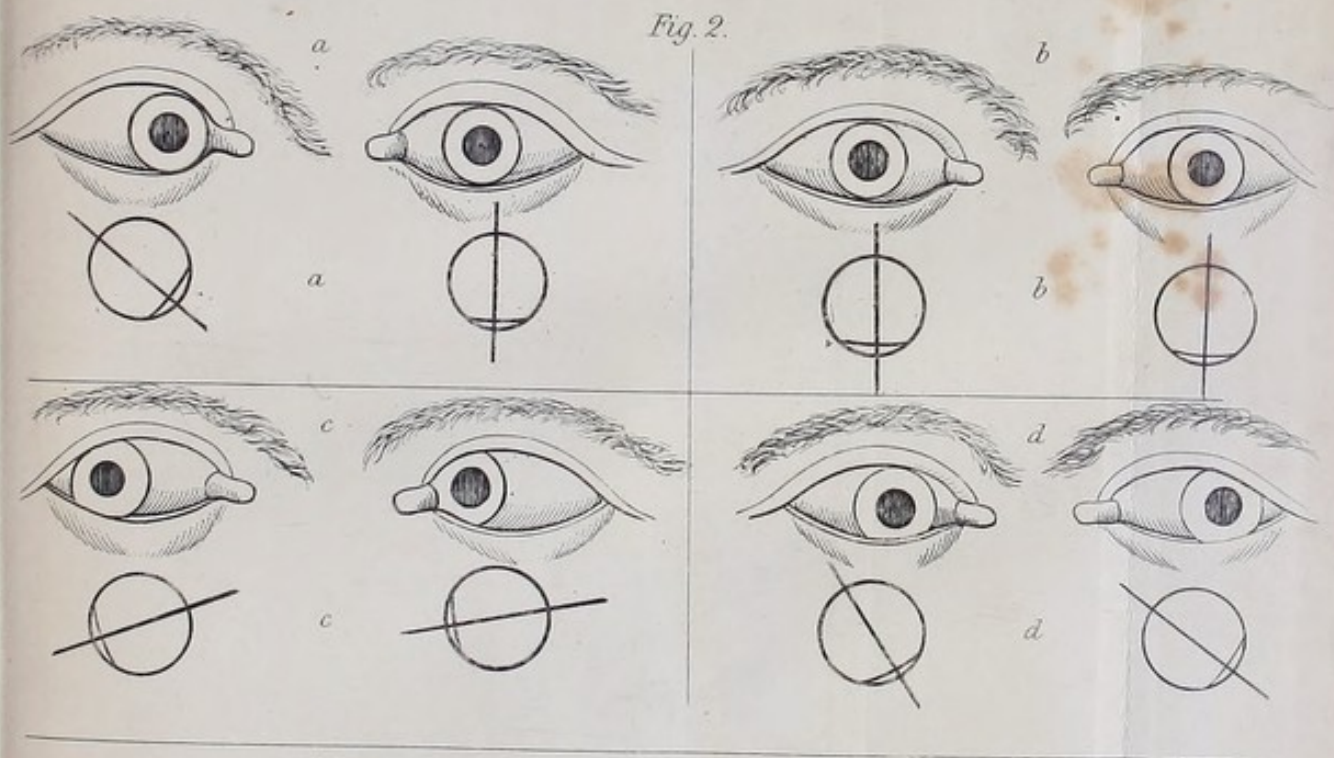
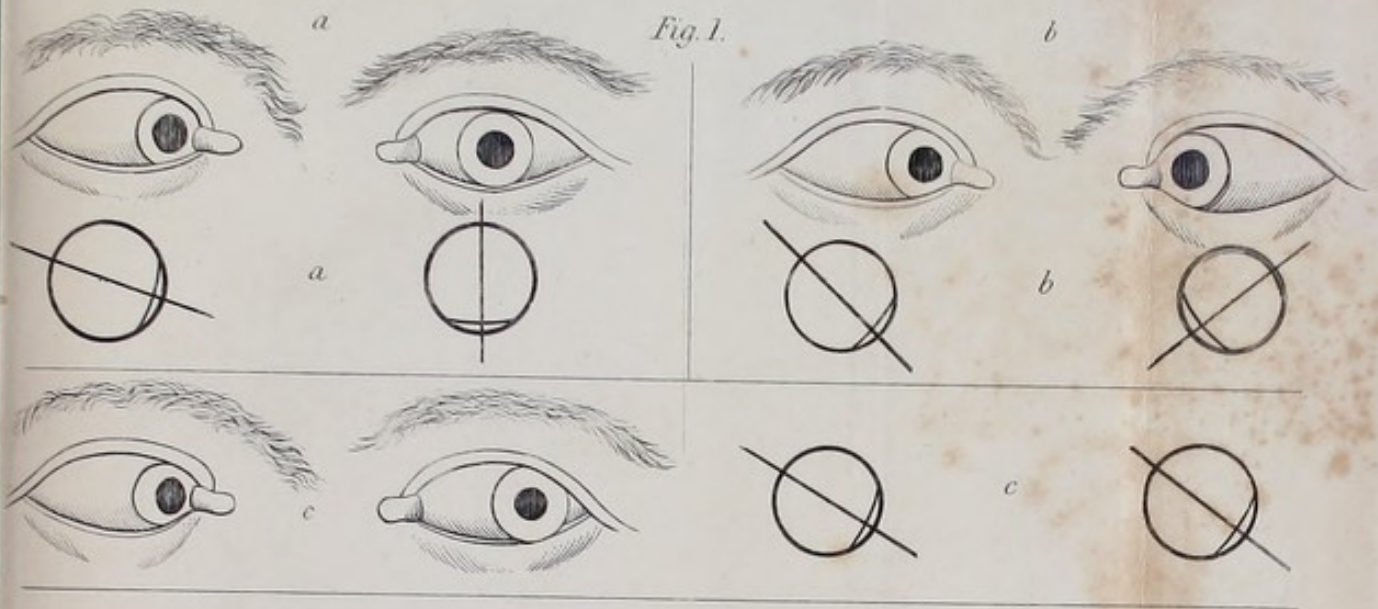
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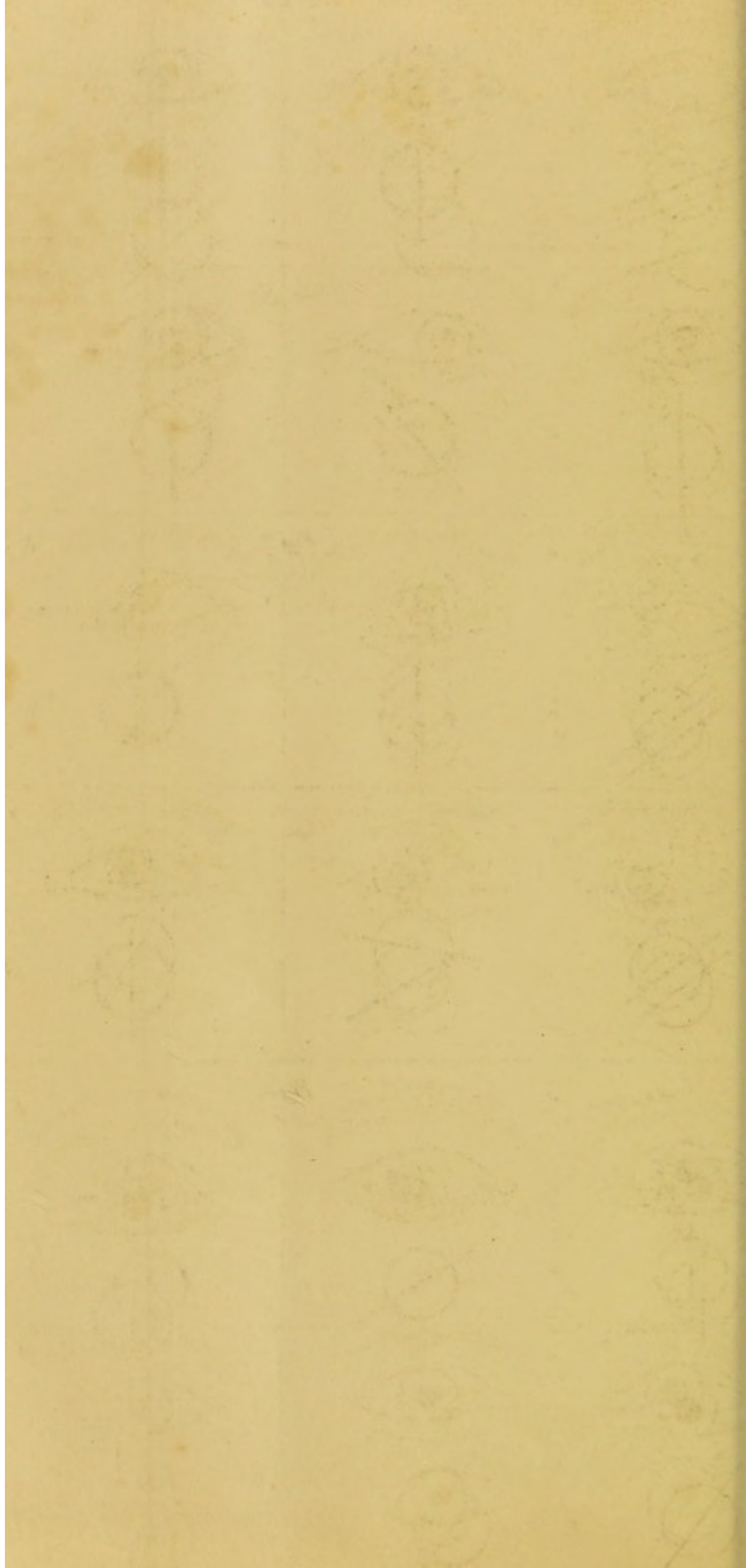


Fig. 1.

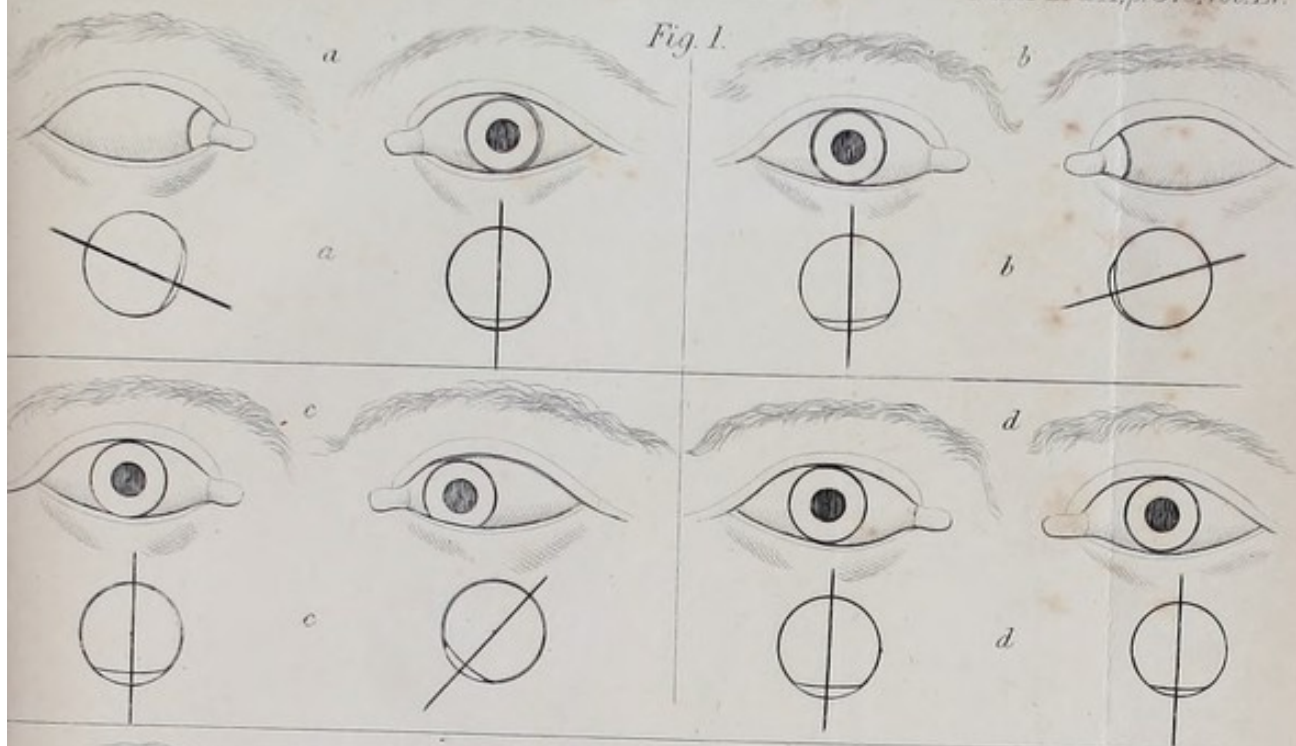


Fig. 2.

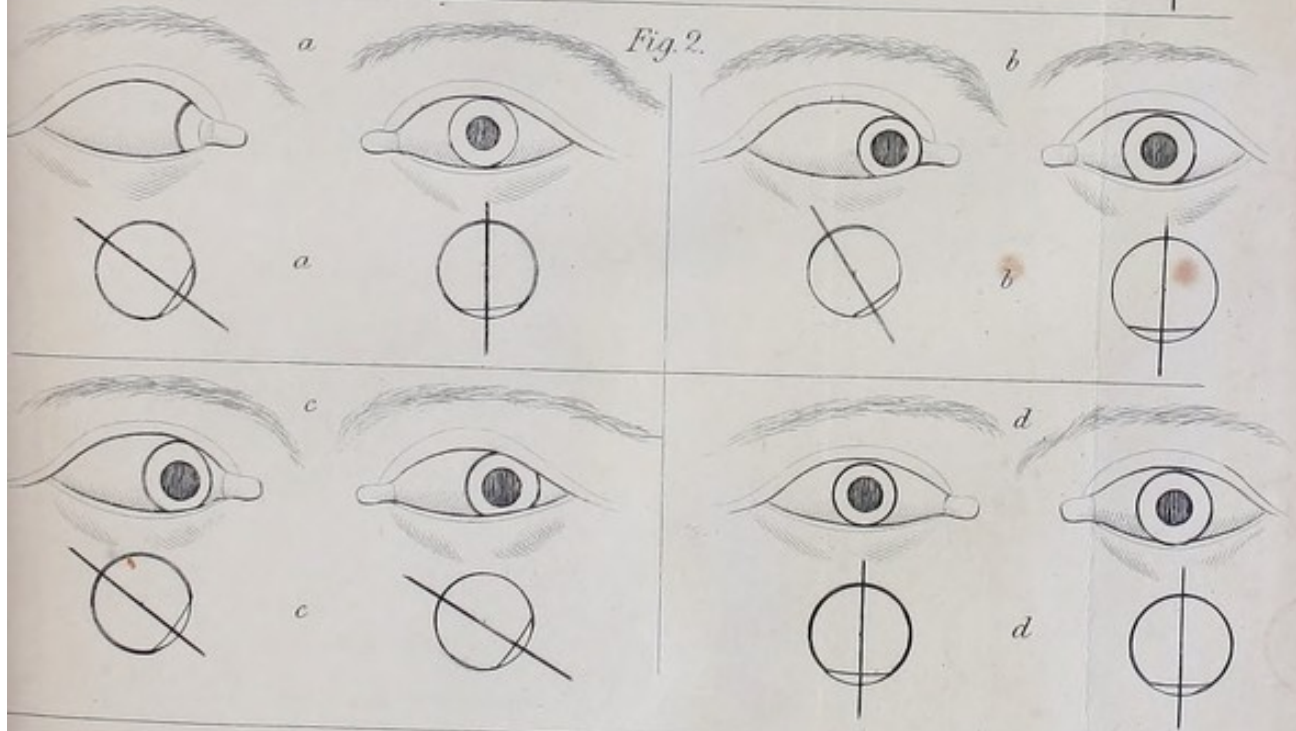


Fig. 3.

