

The radical cure of extreme divergent strabismus : a paper read in the Senate House of the University of Cambridge at the meeting of the British Medical Association, held August 4th, 1864 / by James Vose Solomon.

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THE RADICAL CURE
OF
EXTREME DIVERGENT
STRABISMUS.



A PAPER
READ IN THE SENATE HOUSE OF THE UNIVERSITY OF CAMBRIDGE
AT THE MEETING OF THE BRITISH MEDICAL ASSOCIATION,
HELD AUGUST 4th, 1864.

(Five Woodcuts.)

ALSO A NOTE ON THE TREATMENT OF CONVERGENT
SQUINT.

BY
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When the point is reached at which the
formation of opinion for the first time
converges, the tendency of the
has acquired a certain momentum
position, and the result, having become
fixed, is not easily changed.

1668422

THE RADICAL CURE OF EXTREME DIVERGENT STRABISMUS.

WHEN a patient affected with divergent strabismus is unable—let his muscular efforts be ever so great—to do more than bring his eye to the centre, the case comes under the category of *Extreme Divergent Strabismus*. This condition may result from several causes; but I propose confining myself in the present paper to the consideration of instances where the deformity has had its origin either in a too free division of the tendon of the inner rectus muscle and the subconjunctival fascia, by Diffenbach's operation for squint; or in paralysis of the inner rectus, unconnected with tumour of the orbit.

When the squint is referrible to a badly performed operation for the relief of strabismus convergens, the tendon of the inner rectus has acquired attachment far behind its normal position, and the muscle, having become con-

tracted and shortened, is no longer competent to antagonise its opponent. The deformity which results from this loss of balance is increased by the caruncle and semilunar fold of the conjunctiva having fallen so far backwards as to be invisible, which gives an apparent increase of size to the eye and a markedly vacant expression to one side of the face.

With a view to remedy one or more of these defects several plans have been tried by surgeons:—

(1.) The excision of a large portion of the *external* rectus muscle. This, when successful, would leave the eye motionless, and is therefore most objectionable.

(2.) The removal of a portion of the conjunctiva between the semilunar fold and inner edge of the cornea, and then bringing the cut edges together by sutures—this, when successful as regards the position of the caruncle and semilunar membrane, fails to cure the divergence.

A *third* plan has been to excise the belly of the inner rectus, and then bring its cut ends together with sutures, the operation being con-

cluded by a tenotomy of the external rectus. Of this method, it may be sufficient to note that in the hands of an able surgeon, the globe sometimes suppurated. Moreover it is not a physiological proceeding, as normal convergence is not restored by it.

A *fourth* method I have been told, since I practised my own operation, consists in dissecting up the inner rectus muscle, dividing the external rectus tendon, and then fixing the eye in a much converged position by ligatures passed through the insertion of the abductor; the internal squint which is induced by the operation being subsequently treated by a sub-conjunctival tenotomy. The objections to this plan are that convergence cannot always be maintained for sufficient time to insure a more forward adhesion of the tendon, without which no benefit would accrue; another and very serious objection is derived from the liability of ligatures so placed, when tense, to irritate the cornea, and if not tense they are useless, and under the most favourable circumstances the muscle does not acquire its normal length.*

* This operation is attributed to Dr. Von Gräfe. It appears to be entirely due to Jules Guérin. He secured the inversion of the eye by a thread passed through the "ocular fascia."—Vide *Desmarre's Traité des Maladies des Yeux*, Paris, 1847, p. 802—3.

In a *fifth* method the inner rectus muscle is dissected up, the conjunctiva being divided by the first incision at two lines from the nasal margin of the cornea. The inner third of the globe being exposed, the external rectus is then divided, and afterwards the bit of conjunctiva near to the cornea is reflected in order that sutures may be more easily passed through it, and there tied, so as to be less likely to cut out. A small portion of the inner flap is now excised—sutures passed, and so united by knots to those already applied, that the eye shall assume a slightly converged position. “*The hope and intention are to get the parts to unite to the globe in their new position, and thus retain the eye. This, however, is only partially the case; there is always some tendency to relapse. The amount of the mobility in the eye is very limited—if sufficient effect is not obtained by the first operation, a second is almost sure to succeed.*”—(Vide *Lancet*, 1855.)*

The fact that this operation—in which there is always some tendency to relapse, which sometimes requires repetition, and when successful, affords only a limited amount of motion to the eyeball—has been practised and recommended by certain ophthalmic surgeons of acknowledged repute, is of itself demonstrative how great are the difficulties which surround the cure of extreme divergent strabismus, and how important it is that a more effective and certain procedure should be devised.

The indications to be fulfilled by any proceeding undertaken for the radical cure of *Extreme Divergent Strabismus*, when a result of previous tenotomy of the inner rectus, are:—To give the eye a central position; to restore the length and the proper point of attachment to the adductor muscle, thereby insuring balance of the opposed muscular forces and *permitting normal convergence.*

* I am indebted to Mr. Critchett for having drawn my attention to this method, a description of which, from pure inadvertence, was omitted in the paper I read at Cambridge, a circumstance which I regret.

The division of the attachments of the inner rectus, with its conjunctiva and subjacent fascia (in a manner to be presently described), and of the tendon of the external rectus, suffices to place the eye-ball in the axis of the orbit.

The great difficulty consists in protecting and fixing the globe until the inner rectus obtains a proper attachment to it. Careful study of the subject led me to institute in persons who are in good health the following plan.

Anæsthesia having been induced by chloroform, and the lids separated widely by a self-acting speculum, the first step of the operation is commenced by making a flap of the parts which contain the inner rectus. To effect this a rather long perpendicular incision is made at about half a line from the inner margin of the cornea, down to the sclerotica; with curved scissors the inner side of that membrane is dissected bare. In order to make the flap come forward and over the cornea, two short incisions are practised through the extremities of the first incision, towards the nose. (Fig. 1.)

(2nd Step.) As soon as it is found that the flap will reach, on being stretched, the vertical diameter of the cornea—when the eye-ball is

in the axis of the orbit—the external rectus is divided by a rather long perpendicular incision, just behind the insertion of its tendon.

The conjunctiva, which intervenes between this incision and the outer margin of the cornea, is reflected forwards, *and made to form a second flap.* (Fig. 2.)

(3rd Step.) The two flaps are united over the vertical meridian of the cornea by sutures, three of which are generally sufficient, one in the centre, one just above and one below the upper and lower margin of the cornea.* (Fig 3.)

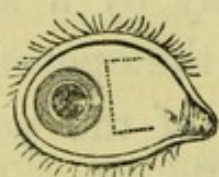


Fig. 1.

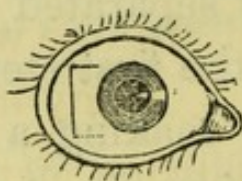


Fig. 2.



Fig. 3.

The eye now occupies the axis of the orbit; the inner rectus is stretched to its utmost limit, and the tendon placed over the most favourable site for adhesion to the sclerotica; the external rectus retracts, and if the power of moving the globe inwards and outwards be tested at this stage, it will be found still to exist, but to a slight degree only, the antagonism being about equal.

* For these sketches I am indebted to my friend and former pupil, Mr. Arthur Bracey.

The *after treatment* aims at securing the immediate union of the inner flap, and the preservation of the nutrition of the globe. These indications are fulfilled by keeping both eyes closed, and with the temples covered for about ten days by jewellers' cotton wool. The central suture is removed on the second or third day so as to obviate *corneitis*. Inflammatory chemosis, should it occur, must be met by the application of two, three, or four leeches to the temple, and pain in the eye by the internal use of morphia. If there be much puro-mucous discharge the local use of astringents is necessary. At the end of three weeks the conjunctiva should be trimmed of any uneven processes.

I have practised this method for upwards of four years with great success.

These stereoscopic portraits exhibit the state of a lady before and after the treatment. It will be observed that the deformity was great, and although not possessed of good features, the patient's expression has been much improved. Not a vestige of outward squint remains, the power of convergence being normal.*

* It has not been considered necessary to reproduce the portraits in this place, inasmuch as the accompanying woodcut of a man affected with paralysis of the muscles supplied by the third nerve demonstrates the value of the treatment.

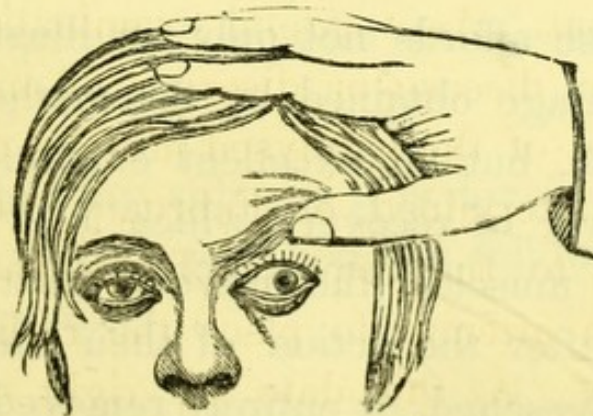
In cases of *paralysis* it will be obvious that careful selection and a special regard to their pathology would be required before recourse be made to surgical treatment.

I have applied the operation in the present year to an instance in which the inner rectus of both eyes and the levator palpebræ of the left were paralysed; there was also paresis of the other muscles which are supplied by the third nerve.

The patient, a man aged twenty-one, applied at the Hospital in October, 1863, complaining of fixed pain in the head, vertigo, and of the affection of the muscles mentioned. A seton was put in the neck and some medicine given. He attended afterwards once only in that year, and was not again seen till February 5th, 1864. He then stated that the seton had cured the pain in the head, and at the end of six weeks from the time of its insertion he had taken it out. As a careful examination failed to discover disease or disorder of any organ except that of the paralysed muscles and their nerves, I determined, on February 15th, 1864, to accede to the request of the patient by making an attempt to place the right eye in the centre. At this date the right eye read

minion type (Jaeger's No. 4) with clearness, and by the aid of a 20-inch double convex glass, brilliant, or Jaeger's No 1. The left eye he stated was always imperfect; with it he read double pica (Jaeger's No. 14). The pupils were of equal size, and very inactive to the usual tests, but contracted well with Calabar bean. The right pupil had a diameter of three lines, and when diminished to one-half that size by Calabar bean paper, the eye read, without the aid of spectacles, brilliant type, or Jaeger's No. 1, indicating that the retina was perfectly healthy.

The position of the eye-balls before operation is well shown in the left eye of the woodcut, and the result of the treatment represented by the right in the same drawing. In consequence of the palsy of the left eyelid it was necessary to elevate it with the thumb while the photograph was being taken.



The power of convergence possessed by the operated eye is shown in the other drawing.



Both of these sketches have been taken from photographs, which I have brought with me, and will hand to the President for your inspection. It will be found on comparing them that the artist has been strictly accurate in his magnified representations.

In this instance the first incision was made to extend over the inner edge of the corneo-sclerotic union, and a piece of the inner flap was cut off, also about one fourth of the external rectus muscle.

The case affords not only an illustration of the advantage obtained by the method which I advocate, but an excellent example of the great power of recovery which is evinced by paralysed muscles (the nervous centres being healthy) after the action of their antagonists has been lessened, or entirely removed.

The more numerous and striking instances of this physiological fact present themselves in the domain of orthopædic surgery, and upon them has been based, by Mr. Barwell, an entirely new method of treatment, in which tenotomy is dispensed with.

In conclusion permit me, Mr. President, to say that I am fully sensible of the numerous points of interest which a more full clinical description of the last case would afford for discussion; I have, however, felt constrained, out of deference to the exigences of this meeting in respect to time, and to the title of my paper, to confine the details to such points as were sufficient to illustrate the particular method of operating which you have permitted me to make known at this meeting of the Association, in your august and time honoured seat of learning, science, and religion.

The operation appears to me to offer the following advantages:—

1. In healthy subjects it is devoid of danger.
No injury to vision has followed its performance.
2. The external squint is completely removed.

3. It restores a normal degree of convergence, hence improves the optical accommodation.
4. It has been successful in a case where the deformity was dependent on paralysis of the inner rectus muscle, and has restored a considerable amount of convergence.

A Gossiping Note on the Treatment of Squinting.

THE more frequent examples of outward squint are moderate in degree, as compared with the form I have defined, the patient being able to converge the eye, and may be cured by a clean perpendicular incision made through the conjunctiva and insertion of the abductor. With a pair of forceps and curved scissors I have often effected this in a few seconds.

If the divergence is slight, and attended, in consequence of the extra exertion thrown upon a weak adductor, by a sense of fatigue when the eye is continuously employed on near and small objects (*asthenopia*), a *subconjunctival* tenotomy should be done. By regulating the balance of opposed muscular forces, the fatigued vision is effectually removed. This class of cases is not common, and very liable to be overlooked. When a near-sighted person complains of *asthenopia*, we should carefully examine how far feebleness of the inner rectus is concerned in its production. An individual possessing Teutonic patience may be cured by wearing prisms of suitable strength.

There is an exceedingly rare form of squint, in which the eye is drawn and fixed downwards—*Strabismus Deorsum-vergens*. During the House-Surgeony of my friend Mr. Thomas Savage in 1861, I operated upon a remarkable instance of this distortion. The inferior rectus had two distinct and broad insertions, one in the usual situation, and another about a quarter of an inch behind it. The patient was 20 years of age. Her mother attributed the squint to a trick she acquired when two years of age, of trying to look with one eye upon the surface of the table, for a view of which she was scarcely of sufficient height. The right eye, which was closed during this act, acquired the downward squint. There was no history of brain disorder. A pretty face gained much by the operation, although, through feebleness of the superior rectus, the defect was not altogether removed a fortnight after the treatment.

Convergent or internal squint is a disease of great frequency, and very generally consequent upon *hypermetropia*.* In all cases the presence or no of this optical defect should be carefully made out, as in certain cases the use of properly selected glasses—by diminishing the efforts of the ciliary muscle to overcome the *hypermetropia*, and preventing the associated convergence (contraction of the adductor)—will suffice to cure the squint; it also prevents occurrence of the impaired vision, which results from suppression of the double image. Moreover, unrecognised *hypermetropia* is sometimes a cause of relapse after successful operation.

Very few children can be induced to wear spectacles; hence a subconjunctival division of the tendon of the contracted muscle, limited according to the slightness of the affection, is the treatment generally adopted by some of the highest authorities on *hypermetropia*. To cut for squint is not difficult; to adapt the extent of operative interference to the degree of inversion and power of the abductor demands experience.† When well performed, the result is more certain and more perfect than any operation in surgery. It is perfectly safe. It never compromises the integrity of the eye. Under chloroform it is painless; without it, bearable. It may be done in all weathers, and so far as the little wound is concerned, seclusion in the house is quite unnecessary. I make these assertions after an experience extending over nearly 25 years and upwards of 1400 operations. *The effect upon vision* is often marvellous; complete blindness being sometimes cured; impaired sight so improved that small print can be read on the day after operation. In a few the improvement is gradual.—(Vide Cases.) The habit of holding the head on one side, and attendant curvature of the cervical spine caused by using one eye, disappear in less than a month. A striking instance, illustrative of this result, occurred in my practice last summer, in the daughter of a medical friend from Ashby-de-la-Zouch.

In very young children Holthouse's knife is useful. As a rule, I prefer Maunoir's scissors and a small short hook. When the eye is small and sunken, and contraction of the muscle and tissues is so great that the globe can merely be brought, by a strong effort, to the centre, if so far, I substitute a small direct perpendicular incision just in front of the tendon for the subconjunctival method. In applying sutures with the object of sustaining eversion, I prefer the tarsus to the skin of the temple for the second point of attachment. In order to obtain the greatest possible advantages from the operation, a carefully conducted after treatment is essential.

As regards this, so much do circumstances vary, no fixed rules can be laid down. Here experience must be our guide.

Much impaired Vision gradually cured by Operation and Spectacles.—Julia Lynes, aged 19, had squinted badly with the left eye since she was eleven, and slightly with the right. With 54 inch convex she read eight-line Roman type (No. 20), at 12 feet only. Without glasses it was invisible (*hypermetropia*). At five inches the left eye read *Double Pica* (No. 14), nothing smaller. The limits of distinct vision in the right were for Small Pica 6½ inches and 15 inches. April 11, 1862, both adductors were divided subconjunctivally under chloroform. The eyes became straight.

* In *hypermetropia* the principal focus of the eye when looking at or beyond 20 feet falls behind the most external layer of the retina. The *antero-posterior* diameter of the eye is too short, the refraction is too low, and in order to correct the latter and obtain a clear image, efforts to increase the convexity of the lens are almost continuous, which, being attended by convergence, often occasion squint.

† The size of the squint is easily gauged by Laurence's *Strabismeter*.

As after treatment she wore weak convex glasses constantly. May 6, the *left*, with 10-inch convex, read Great Primer (No. 12); June 17, Bourgeois (No. 6); July 22, Minion (No. 4). Vision gradually improved up to September 23, when she read Small Pica with the *left*, at from $5\frac{1}{2}$ inches to 13 inches; with the *right* from $1\frac{1}{2}$ inches to 22 inches. Aided by convex 18 inches, the left read brilliant type at 12 inches, showing the impaired vision had disappeared, and the hypermetropia was much diminished.

The Cure of Squint without Operation.—Master W., aged 9, has had for two years a decided squint of the left eye, and for a month a slight convergence of the right. During the latter period double vision has disabled him from learning his lessons. The limits of distinct vision in the *right* eye for brilliant type (Jaeger's No. 1) are 8 inches and 15 inches. With a 48-inch convex glass they became 5 inches and 14 inches. Distant objects are also better defined (*Hypermetropia and Presbyopia*). The *left* eye reads nothing smaller than Pica (No. 10), at from 5 inches to 14 inches; with convex 16 inches Minion (No. 4) is read. Power of abduction good in both eyes. It occurred to me that by paralyzing the ciliary muscle of the left I should so calm that of the right eye as to cure its squint. I therefore introduced a 4-grain solution of atropia, and in half an hour the distortion and double vision had ceased. To correct the *hypermetropia* the young gentleman was directed to wear convex 48 constantly. When under atropine the left eye reads Minion type by the aid of convex 4, at 5 inches. In order to improve its vision he works the eye for ten minutes three times a day. I have treated slight cases of squint by convex glasses since the year 1856. The application of prisms for the same purpose originated, I believe, with Mr. Gargory, of this town, in 1838-9.

A slight Squint: Stone Blindness: Operation: Sight restored the same day.—A fair complexioned girl, 13 years of age, was brought to me on account of "stone" blindness of the *left* eye, which had also a *slight* inward squint. The blindness was believed to have existed seven years. The *right* eye was near sighted, but in other respects healthy. Neither the history of the case nor examination revealed an adequate cause for the loss of sight. My efforts to remedy it having proved unsuccessful, I proposed, by way of improving the girl's appearance, to remove the little squint. This was assented to, and the adductor tendon was divided subconjunctivally on the 29th of April, 1859. On the evening of the same day the patient discovered that she had obtained clear vision in the operated eye. On May 3 I tested the sight, and found one eye as good as the other.

96, Newhall Street,

Birmingham,

December 1, 1864.