CONVERGENT STRABISMUS AND ITS RATIONAL TREATMENT.

BY SAMUEL D. RISLEY, A. M., M. D.,

PROFESSOR OF DISEASES OF THE EYE IN THE PHILADELPHIA POLYCLINIC, SURGEON TO WILLS EYE HOSPITAL, LECTURER ON OPHTHALMOLOGY IN THE UNIVERSITY OF PENNSYLVANIA.

From The Philadelphia Polyclinic, June, 1893.

THE

PHILADELPHIA POLYCLINIC.

VOL. II JUNE, 1893. No. 6.

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Gentlemen:—I call your attention to-day to a group of four cases of strabismus convergens, now under treatment at the clinical service, and will make them the basis of a few practical remarks regarding the management of this interesting and important affection. Its importance in the mind of the surgeon will vary in some measure in accordance with the ideals he desires to reach as the result of treatment.

If the convergence is regarded as a simple deformity, which for cosmetic reasons he wishes to overcome, the task before him is not a very difficult one, since his patient's desire to be freed from a gross deformity is readily satisfied in most cases of convergent squint by properly performed tenotomies.

If his ideal, however, is to maintain binocular vision throughout life for the child who is brought to him with a periodical or intermittent strabismus his task is a more difficult one, and if successfully accomplished will be done only through a thorough understanding of the intricate physiological problems involved in the etiology of the affection. The surgeon who contents himself by tenotomy

[1]Clinical lecture delivered at the Polyclinic Hospital.

of the muscles of every squinting child will in subsequent years have much cause for self-condemnation.

There is marked similarity in the history or symptomatology of the affection. Usually during early childhood, from two to five years of age, its beginning is noted by the anxious parents. It may be many weeks or months even before they are convinced that their fears are not groundless, so intermittent and evanescent is the affection during its earliest history. The eye is seen drawn strongly inward, but when attempt is made to verify the observation the eyes are once more parallel, and the parents are left in doubt.

But soon the phenomenon is repeated, and with steadily increasing frequency, until there is no longer room for doubt, and the child is taken for professional inspection and advice. It is cause for congratulation if wise advice is received at this early stage of the affection, for it is yet possible in typical cases to break up the tendency to convergence and maintain binocular vision. If neglected, the subsequent history will depend in some measure upon the nature of the underlying etiological factors. Permit me to say here that affections of innervation are excluded from these remarks, except as we shall mention them for purposes of differential diagnosis.

The intermittent or periodical character of the affection soon gives place to a state of permanent convergence, which will present one of two varieties of phenomena. One eye may be habitually drawn inward while the other is always the fixing eye; or the patient may fix or converge with either eye quite independently, but one or the other eye will always converge, in which case it is known as an *alternating squint.*

In both cases they are *concomitant.* That is to say, if the fixing eye is covered, and thus excluded from vision, the converging eye turns outward to fix any indicated object; while the covered eye rolls in toward the nose. At no time are the visual axes parallel. This is easily demonstrated on each of these four cases, all of which are examples of *concomitant converging strabismus.*

In one of them another phenomenon is present, not

observed in the others, and I call your attention especially to this case, because I wish to place you on your guard, whenever you observe this peculiarity. You will notice that the right eye turns inward strongly, but also upward and comes downward and outward to fix, while its fellow, the left eye, comes directly outward but with an unsteady wavering movement. I recall a case of this type seen in private practice, in which operative procedure was deferred while the existing high grade of refractive error was corrected by glasses. The child, after receiving the correcting glasses, was lost to observation for two years and returned with a wide divergence. The former convergence was due to the effort of the internal rectus to aid the vertical muscles in overcoming a high degree of hyperphoria. The real fault was in one of the superior rectus muscles, and it would have been a serious mistake to have cut the internus. This is a not infrequent error in the surgical management of strabismus, this fault in the vertical balance of the eyes being overlooked, and the error being once committed is difficult to mend.

In typical cases of strabismus, in their earlier history certainly, you will be able to separate them from ocular paralysis by the fact that the degree of movement in all directions is equal for both eyes and quite normal, whereas, in affections of innervation the movement is limited in the direction of the faulty muscle. Moreover, in strabismus, the image in the converging eye is excluded from mental notice, while in paralysis there is annoying diplopia.

Strabismus may then be defined *as a defect of muscular balance, characterized by the fixing of one eye upon the observed object, while the other deviates from its normal direction, the degree of movement in each being equal and normal.*

I come now to speak of the causes of this curiously interesting affection. There are a few cases of convergent strabismus associated with myopic refraction of the eye and still fewer in eyes which are emmetropic. I have observed but one such case. With rare exceptions it is one of the concomitants of hypermetropic refraction. I have already discussed with you the important relation existing between

the power of accommodation and the ocular balance in these hypermetropic eyes, and then took occasion to teach the intricate relation of cause and effect, not only in the production of strabismus, but in causing a much larger group of muscular anomalies, in which there is a tendency to deviation from parallelism of the visual axes, but which is nevertheless successfully resisted. I will, therefore, pass over this all important phase of the subject.

It is interesting to inquire, if hypermetropia is the cause of strabismus convergens, why do not all cases of hypermetropia develop this tendency?

It is possible that in some cases the convergence is favored by some peculiarity in the shape of the face and the orbit, or in others by some anomaly of development in one or more of the ocular muscles; but a brief study of a large group taken from my private case books revealed some interesting facts in this connection. The exact figures I leave for a more elaborate study than I can give in these clinical remarks, but in a very large percentage of the cases the converging eye was the more defective. That is to say, the degree of refractive error was in simple H, higher in the squinting eye than on the other side; or there was simple H in the fixing eye and astigmatism, either simple or associated with H, in the converging eye. In a word, the nature of the existing anomaly was such as to disturb the function of the habitually squinting eye more than on the other side, and probably determined the occurrence of strabismus. When the strabismus was alternating the defect was almost without exception not high and was the same in degree or approximately so in each eye.

In cases of alternating squint, or as long as the affection remains intermittent, the acuity of vision is not reduced, but no sooner does the deviation become constant than the eye begins to suffer a diminution of vision which is progressive until, in cases of long standing, the power of fixation is lost, and even the largest letters cannot be made out. The eye, however, never becomes totally blind. The field of vision on the squinting side remains useful in preventing accident, so that such persons do not suffer the same

inconvenience at a street crossing, for example, as one who has suffered the loss of one eye.

The ophthalmoscope throws no light upon the cause of the reduced vision, since there is no discoverable organic change in the retina. Opinions differ regarding the nature of this amblyopia of the squinting eye. Some think that it precedes the occurrence of the strabismus and indeed causes the convergence, but admit that it increases after the establishment of the squint.

It is not always possible to demonstrate the error or correctness of this view, since both the amblyopia and convergence are present when the case is first seen by the surgeon. That the amblyopia steadily increases, however, cannot be denied since it has been so frequently demonstrated by observation. While this view then may be correct in some cases it certainly is not true for many others.

The explanation which is offered for its occurrence is that in consequence of the habitual suppression of the image, thus excluding the eye from participation in vision, it loses the power to see. That the senses can be sharpened by strict mental attention, is a fact we all recognize, and that we can by psychical seclusion set aside physiological sensibility, is probably illustrated by these cases of amblyopia from disuse.

The correctness of this explanation seems to be demonstrated with sufficient clearness by the following considerations. In the first place, its occurrence can be prevented by a forced exercise of the eye, or when present, if not of too long standing, it can be overcome by the same means. I recall the case of a boy six years old, who had had strabismus for about one year.[1] The vision was reduced to one-half in the converging eye. One month after a successful tenotomy and daily exercise of the eye, the vision rose to normal sharpness. It is not unusual to see well marked improvement in the vision rapidly take place after tenotomy. The following case illustrates this fact with much force:

[1] Strabismus Convergens with special reference to its Etiology. *Medical Times* April 12th and 19th, 1873. By S. D. Risley, M. D.

In 1869, a patient, aged 15, had tenotomy performed on both eyes, at the Wills Hospital, for convergent strabismus; she was then "almost blind" in the right eye; correcting glasses were not given. I saw her four years later. She then had a recurrence of the strabismus, but the right, which had before been the converging eye, was now the fixing eye, and had normal acuity, while the left or converging eye, which before had "good vision" was reduced to $v = \frac{1}{10}$. She had H = 3. D. The refractive error was corrected and tenotomy again performed on both eyes. The amblyopic left eye was exercised on the finest print which could be deciphered, one or two hours daily, the right eye being closed by a light bandage. Three months later there was no return of the convergence and $v = \frac{3}{4}$ in the left eye, and 1 in the right. In this case both eyes had in turn been amblyopic, and both were restored to normal acuity of vision.

When the amblyopia is of long standing, however, there is no hope for restoration of useful vision. You will see, therefore, that the surgeon has a higher and more important duty before him, in undertaking the management of a case of strabismus, than to merely overcome a deformity which is annoying to the patient and his friends. It is the maintainance of useful binocular vision. That this can be done I have frequently demonstrated in practice.

Very recently I was consulted for a change in the correcting glasses by a patient I had seen three years ago, with a marked converging strabismus of a year's standing, and to whom I had given correcting glasses. There was no longer any tendency to convergence, the patient enjoyed binocular vision, and the most rigid tests demonstrated orthophoria.

When consulted by these young patients, developing convergent strabismus, a mydriatic and protecting dark glasses should be ordered. The paralysis of the accommodation by the mydriatic, breaks up for the time being the intimate relation between convergence and accommodation, and often in a very few days you will be gratified by seeing the convergence disappear. It is frequently necessary to continue the drug for a week or longer. If the convergence is

of too long standing you may be disappointed but in either case the existing error of refraction should be as carefully corrected as possible, by accurately fitting spectacles, and the mydriatic stopped.

If the correction is accurate the strabismus will not return in a large number of these little patients. If it does I call in question the accuracy of the glasses and go over the work again, with or without the mydriatic. The glasses should be worn constantly. For a long time the tendency to convergence remains, becoming manifest as soon as the glasses are removed.

When failure follows this procedure it may be due to a permanent organic change in the converging muscles and will be relieved only by tenotomy. But this should not be performed until the glasses have been worn for two or three months, or even longer, if any progressive diminution in the convergence is noticed. Another, and I think a frequent cause of failure, is the absence of a proper vertical balance between the eyes, i. e., hyperphoria. This may often be demonstrated by a trial prism, with its base up or down as the case may be, before the squinting eye.