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ON SOME FORMS OF HEADACHE.*

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THERE are a large number of forms of headache, which are quite unconnected with any defect in the eyes. Again, there are many forms of headache, which owe their cause to easily diagnosable eye affections, such as Glaucoma, Iritis, etc. With neither of these does this paper attempt to deal.

Lastly, I come to the large class of cases in which headache and other evidences of asthenopia are to be accounted for either by the presence of an error in refraction or by what is now known as "an error in the muscular balance of the eyes." It is only to a part of this class even that I desire to direct your attention. The larger errors of refraction lead to a sensible diminution of visual acuity, and at once direct the attention of the parents, the friends or of the patients themselves to the cause of the

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trouble. Likewise a marked strabismus is not easily overlooked, and will drive even an ignorant person to seek medical relief, with the key of the trouble as it were in her or his hands.

Strange as it at first sight may seem, these marked cases of ocular defect are not always productive of headache. The reasons for this are not however hard to find. Lastly, I come to the class of cases of which I wish to speak to you to-day, *viz.*, the lesser or latent errors of the intra or extra ocular mechanism, which may lead to chronic asthenopic symptoms.

It very frequently happens to me to meet with such cases in which able and well-known medical men have exhausted the whole battery of their medical armentarium, before it has occurred to them to think that possibly the patient's "whole trouble lies in his or her eyes." Again I meet with cases, such as a medical man here present recently sent me, in which the patients have steadily rejected the advice to obtain an expert opinion on the condition of their refraction on the ground that they could see as well as any one else, and therefore it could not be their eyes which were at fault.

It would be beside my present purpose to enter into a detailed description of the anatomical arrangements of the intrinsic or extrinsic musculature of the eyes, but I may be permitted to recall a few simple facts to your memory.

The external and internal recti are respectively pure abductors and adductors. The superior and inferior recti beside elevating or depressing the eyes are adductors; whilst the two obliques are subsidiary abductors.

The superior recti and the inferior obliques elevate the eyes, whilst the inferior recti and the superior obliques are depressors.

The superior recti and superior obliques are internal rotators, *i.e.*, they turn the vertical meridian of the eye in such a direction that its upper end approaches the mid-nasal line; whilst the inferior recti and obliques are external rotators of the same meridian.

If you will consider this very complicated apparatus for a few moments at your leisure, you will be struck with the intimate interweaving of physiological function it indicates, and you will appreciate better the elaborate system of musculature which many a thousand generation has built up for the eyes of the human race. You will be impressed with the inanity of the old theory which attributed to the pure abductors and adductors respectively the whole responsibility for the correct supervision of the movements of convergence and divergence. It will be plain to you that we should look on adduction and abduction as complicated actions, the product of the blended physiological activities of many muscles. Again, I would ask you to call to mind how the human race has made use of this intricately woven system of muscles. We have made great progress since the time, when in 'the first red dawn of man,' the use of an opposing thumb led our remote ancestors to pick up the objects they found in their path and to scrutinize them with their eyes. On that opposing thumb hung the destinies of higher evolution, inasmuch as it paved the way for cerebral development, which again reacting on the musculature of the eyes established a basis for ever-increasing intellectual advancement. This is leading me however from my immediate subject. With the scrutiny of near objects, we believe, awoke the impulse for accommodation, and for convergence. Side

by side through countless ages grew these two wonderful functions intimately, blended, closely interdependent, and essential for the highest development of "the heir of all the ages."

Gentlemen, there is a drawback to all elaborate apparatus, be it human or mechanical; it is liable to break down. Its very elaborateness is its greatest danger. It will do better work than simpler mechanism; but the more elaborate it is, the greater is the danger that it will run out of gear, should aught untoward befall it. I need not waste time in telling you how much the normal eye owes to the interdependence of its functions of accommodation and convergence, but I do wish to impress on you how easy it is for a very small fault to throw the whole mechanism out of gear. Just as a loose nut, or a tiny leak will stop a complicated engine and render it temporarily useless, so a small fault in one or more muscles may throw the whole musculature of the eye into disorder, and bring in its train a system of symptoms whose gravity seems out of all proportion to the apparent insignificance of the lesion in question. I am convinced of one thing, that not a few of the diseases which we treat patients for and think they have convalesced perfectly from, leave a stamp for all future years on the muscular balance of the eye. Influenza and diphtheria are probably the two most dangerous diseases in this particular line. Again, many patients are born with faulty muscular balance, though this may not be revealed till either some great strain or the advance of age lays its finger on the weak spot and exposes the defect to the patient in a school of suffering, from which he is fortunate if he is delivered by a correct diagnosis of the cause of his infirmity. I fre-

quently meet with men and women who regard themselves as always having had excellent sight and who find it hard to believe that their eyes are alone responsible for all the misery they have been suffering. Long service in India, prolonged lactation, the too rapid bearing of children, a long course of malaria, a severe operation, or any similar cause of debilitation may be the first factor in awaking a trouble whose course may easily be lifelong, unless effectively dealt with.

The point to which I have been leading up, is that a harmonious relationship must be maintained between the reflex actions of accommodation and convergence. It is possible for this to be disturbed on either side. The state of the refraction may be such that an undue or an overdue effort of accommodation may be called for; whilst on the other hand the extrinsic musculature may, owing to a fault in innervation or in the state of one or more of the muscles, be unequal to the necessary exertion or may over-exert itself, when called into action. All that is present may be a tendency to abnormal deviation of the optic axes. This tendency may be suppressed by a farther muscular effort, and may remain only a tendency, whilst at the same time giving rise to asthenopic symptoms of considerable gravity. By the Maddox Rod test, by the aid of Stevens' phorometer, or by still other means it is possible to convert the tendency to deviation into an actual deviation, to ascertain its precise nature and to measure its amount.

To the conditions we are discussing Stevens gave the name of Heterophoria. Others have spoken of it as 'suppressed squint.' The latter term is good enough so long as we remember

that the boundary line between a suppressed and an actual squint may never be passed, though lifelong inconvenience may be caused by the condition. Heterophoria may be sub-classified into Esophoria (a tendency to inward squint), exophoria (a tendency to outward squint), hyperphoria (a tendency to the upward deviation of one axis) and cyclophoria or twisting of the eye.

Heterophorias, like apparent squints, may be classified into the paralytic and the concomitant, and the diagnosis between them rests on the same factors as are taken into account in differentiating ordinary squints. The only thing to bear in mind is that one must first make the heterophoria apparent by one of the methods above sketched. One can then proceed to a diagnosis in the usual way.

In conclusion, I have a very few words to say on the headaches caused by minor errors in refraction apart from any co-existing heterophoria. The more intellectual, the more observant and the more highly strung an individual is, the more likely is he to suffer severely from the results of small errors in refraction. Hyperopia is more likely to lead to asthenopia than myopia is. Astigmatism is also in both hyperopia and myopia a fruitful source of trouble. The natural consequence is that it behoves us to make our methods of diagnosis as perfect as possible. I therefore think that a short demonstration of the methods I now use may not be without interest to you.
