MYOPIA AND PSEUDO-MYOPIA*

BY

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VARIOUS theories have been made as to how myopia may progress. I myself have suggested that progression may coincide with an abnormal rate of growth in the adolescent child. My friend, Dr. Dunstan produced statistics which showed that progressive myopia tended to be found in tall, fair, slender children. The weight does not increase proportionately to the increase in height. I still consider that this is one aspect of the problem, but I have always held that there are other causes, for all progressive myopes are not tall, fair and slender. We all have had cases in which the myopia increased but the rate of growth was slow. I now suggest that spasm of accommodation may be an important factor. Very little seems to have been written about accommodative spasm, and, in fact, some authorities consider the condition rare. But, it would appear from cases which I have seen, that it may be commoner than has been supposed, and the fact that it has been found in myopes may point to another cause of progression. We are all familiar with the case which accepts too high a correction, say one or even two dioptres more than the lens indicated by the refraction. It is very tempting to give a patient this added correction, but are we not producing an artificial increase in the myopia? Pseudo-myopia is the same thing as spasm of accommodation, but the term, perhaps, emphasizes a different aspect of the condition. Spasm of accommodation may be found in myopes, emmetropes and hypermetropes, in the young and in the middle-aged. I have used the term pseudo-myopia, as for the moment, I am more concerned with the problem of progressive myopia, but the cases which I am going to quote will include spasm of accommodation in middle-aged as well as adolescent and hypermetropes. My present ideas began to take shape in August, 1944, when a boy was brought to me because he had been rejected for entry to Dartmouth on the grounds that he was myopic, and his mother did not agree with the diagnosis. For once mother was right.

(1) This boy, aged 13½ years, had been examined, in the usual way, for entry to Dartmouth, and had been rejected for "myopia and myopic astigmatism." He was refracted without a mydriatic, but when his mother appealed, he was re-examined after "drops" had been instilled once, and I presume that these drops were homatropine. He was again rejected for the same

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reason. He was then brought to me, when I found that his vision was R. and L.E. 6/6 partly (without glasses), and his refraction without a mydriatic was then R. and L. -0.50 D.Cyl. 180, and his vision with this correction was R. and L. 6/6. His vision was, however, very variable, sometimes being 6/6, and sometimes 6/9 without any lens. After six orthoptic treatments his refraction *under atropine*, administered twice a day for three days, was R. and L.E. *plus* 0.25 D.Sph. *plus* 0.25 D.Cyl. vertical. Obviously, we may call this pseudo-myopia, and the correct diagnosis was of such importance to this boy, that I determined to examine all patients under sixteen under atropine.

(2) A girl who was brought to me in February, 1945, because she refused to wear the glasses, which had been prescribed by someone else, saying that they were uncomfortable, is a typical case. Her age was 12 years, and her vision R.E. 6/24 L.E. 6/36 partly, and she had been given R. and L. -1.25 D.Sph. as glasses for constant use. These she found uncomfortable. Under atropine given twice daily for three days refraction showed her to be *emmetropic*. While under atropine the vision of the right eye was still 6/24, but that of the left eye had risen from 6/36 to 6/24, even though the atropine had been used for three days only. The synoptophore readings were as follows:—Sim : Per : 0, Fusion obtained at 0, Adduction 5, Abduction 5, Rod eso 1, Wing 0.2 exo and Liv : Bin : G : 6 cms. There was intense macular suppression on all tests. She made good progress with orthoptic training. This was a case of emmetropia, which needed such treatment.

(3) A boy, aged 17 years, gave a history of having been examined two years before for "short-sight." The first oculist said he did not need glasses, but the second prescribed R. and L. -0.25 D.Sph. -0.25 D.Cyl. vertical, for constant use. On neither occasion had he been refracted under a mydriatic. His refraction under atropine was R. and L. *plus* 0.75 D.Sph. His vision was R.E. 6/9, L.E. 6/6, but was variable. He was examined on the synoptophore, and the report was:—Sim : Per : plus 1, Fusion obtained at 0, Adduction 20, Abduction 4, Stereopsis present, Wing 3.5 eso, Liv : Bin : G : (objective) 17 cms. "There is marked suppression present with poor convergence and adduction. There does not seem to be any blurring on the synoptophore, which might suggest spasm, but all tests are a great effort, and cause discomfort." In a very few cases spasm may be noted on the synoptophore, but in most cases it is only disclosed by the use of atropine, which should always be used.

(4) A similar condition will be found in adults, for instance, a woman, aged 34 years, complained of headaches. She had been wearing R. and L. -0.75 D.Sph. for general purposes. Her vision

without glasses was R. and L. 6/9 partly. She was interesting because she had no power of convergence, suppressed much, and had photophobia. I shall refer to this combination of suppression and photophobia again later. Her refraction was emmetropic.

(5) A year ago I was asked to see an extremely interesting patient of 50 years of age. She was seen by her doctor on August 3, 1945, who found that her sight was satisfactory, but two days later her vision had failed. When I saw her on August 8, her vision was 6/60 in either eye. The R. vision with plus 1.75 D.Sph. was 6/36, and the L. vision with plus 1.75 D.Sph. was 6/18 partly. I tested her with the Worth lights with the curious result that she suppressed the red light, and saw three Worth dots with the red glass before the right eye, and three Worth dots with the red glass before the left eye. She had slight conjunctival hyperaemia in the right eye, but otherwise appeared to be normal. She had had a severe attack of alopecia, but was now recovered. Her synoptophore report was as follows:—Sim : Per : 0, Fusion obtained at 0, Adduction 20, Abduction 4, Rod eso 2, Wing exo 2-4, and Liv : Bin : G : (objective 16 cms.), (*subjective 10 cms.*). "The loss of vision appears to be due to a severe ciliary spasm which should be relieved by atropine treatment later." I kept her under atropine in spite of her age, and she made an excellent recovery. In the following December her synoptophore report was as follows:—Sim : Per : 0, Fusion obtained at 0, Adduction 30, Abduction 6, Rod ortho : Wing Ortho : Liv : Bin : G : (objective 6 cms.), (*subjective 19 cms.*). "Quite comfortable now." It will be noted that her vision had risen to 6/6 without glasses. I saw her again this summer, ten months after the first visit, when her condition was quite comfortable with full vision, and no return of the symptoms.

Sir John Parsons says . . . "excessive contraction of the ciliary muscle; a condition which we call 'spasm of accommodation,' is probably diagnosed more often than it occurs, and that it is only found in young patients." But, however, I have quoted to you one patient of 34 years and another of 50 years.

So far we have only considered cases of pseudo-myopia, but let us consider myopes with pseudo-myopia. But before considering such cases, it is necessary to decide if it is permissible or safe to give orthoptic training to myopes. To the best of my belief it was held that it was dangerous to do so, but I may be mistaken. I was, however, confronted with a case where orthoptic training was much needed, although the patient was a fairly high myope. I hesitated to prescribe this treatment, but after keeping him under observation for a time, I decided that it must be given. He has responded well, and has sustained this response without any increase in the myopia. He was a case of myopia with diplopia and suppression.

(6) He was 14 years of age when he was first brought to me, and was already wearing glasses for myopia. His myopia had increased since the time when these glasses were prescribed, and so I ordered fresh glasses, namely, R.E. -4.25 D.Sph., L.E. -5.0 D.Sph., and with these he saw R.E. 6/6, L.E. 6/18. Six months later his right eye was unchanged, but there was an increase in the myopia in the left, and with the new glasses he saw 6/12 partly with the left eye. He had been bothered with diplopia for some time, in fact that was why he was brought to me. I was doubtful if the myopia in the left eye had increased as much as it appeared, but eventually I was able to prove that the increase was real. His synoptophore report was, however, very informative; it was as follows:—Sim : Per : 0, Fusion obtained at 0, Adduction 5, Abduction 2 (all with glasses), Stereopsis slow, Worth lights 5, Wing 2-4 exo, Liv : Bin : G : (objective test) 7 cms. I was very doubtful if it would be wise to let him have orthoptic training, but in view of the diplopia, which bothered him considerably, I felt justified in letting him try. He responded very quickly, for in a month his adduction, without glasses, was 50, and his stereopsis good. The diplopia was improved, for although he saw 5 Worth dots to begin with, they quickly became 4. The exophoria on the wing had improved to 0-2, and he could converge to 6 cms. What was almost more important, his vision had improved to R. 6/5, L. 6/9 partly with his glasses, and his myopia had not increased.

I will now allude quite briefly to two cases of myopia with pseudo-myopia.

(7) The first was a girl, aged $8\frac{3}{4}$ years, whose vision was 6/18 when first seen. Under atropine her refraction was R. and L. -0.75 D.Sph. and her vision 6/5 with this correction. There was an increase of 0.50 D.Sph. in the myopia three months later, which remained stationary for a year, but her vision then had fallen to 6/12 with glasses, although the myopia had not increased. The synoptophore report showed she had marked suppression and very poor fusions.

(8) In 1944, I saw a girl, aged $8\frac{1}{2}$ years, whose vision was R. and L. 6/36 partly. Without atropine, her refraction was R. and L. -1.75 D.Sph. and with this correction she was 6/6. Her synoptophore report was as follows:—Sim : Per : plus 1, Fusion obtained at 0, Adduction 8, Abduction 3, Stereopsis present. There was some suppression present but not in any great degree. With orthoptic training, her adduction improved, and her vision came up to 6/12 without glasses, but after six months, her vision fell back to 6/24, but her muscle balance and adduction remained satisfactory. A later report showed the following:—Sim : Per : 0, Fusion obtained at 0, Adduction 20, Abduction 4, Worth lights 4, Rod exo 4, Wing Ortho : Liv : Bin : G : 10 cms. I tested her

again under atropine and found that her refraction was -0.75 D.Sph. I ordered this correction for constant use which put her vision up to 6/6. I consider she is a case of progressive myopia with pseudo-myopia, and it should be noted, that even now, she is not wearing as much correction as she liked on her first visit.

(9) The following case is also of interest. When I first saw her at the end of last year, her vision was 6/60. Her refraction under atropine was R. and L. plus 0.75 D.Sph. and her vision while under the mydriatic was R. 6/36, L. 6/36. Her synoptophore report was as follows:—Sim: Per. 0, Fusion obtained at 0, Adduction 2 blurred, Abduction 7, Worth lights 4, Rod exo 3, Wing 01-2, Liv: Bin: G: (objective 10 cms.), indefinite evidence of ciliary spasm. I kept her under atropine, and she started orthoptic training before the effect of the mydriatic had worn off. Her second synoptophore report was given this summer, and I refracted her again, and found that her refraction was now -0.75 D.Sph. She, therefore, was a case of pseudo-myopia and progressive myopia in a hypermetrope.

It is not always realised that hypermetropes can often have progressive myopia, and I well remember a case of a boy of 13 to 14 years whose refraction was plus 5 D.Sph. He grew extremely rapidly, being about six feet when barely 15 years, and his refraction temporarily became -1 . Thus he was in reality a progressive myope of six dioptries. Therefore, the lessening of the hypermetropia in the adolescent is not necessarily the cause for rejoicing.

These cases are of very great interest, and open up an important field for investigation. We all have had cases in which the myopia has not increased, but the vision has fallen, or that the vision is not as high as we might expect. In these cases we have reduced as far as possible the amount of reading and other close work, and in the case of children in schools for myopes, they have been put in the "non-sighted" class. In many, perhaps in a big majority of these cases, the sight has improved with these precautions, but it would be interesting to have a synoptophore report on these children, for I think that in a good many of them we should find that there was spasm of accommodation, suppression or other defects which might be remedied by training. So far, I have not found any evidence that myopia is increased by such training, and I do not see why it should. In any case one would not send a case for treatment unless there was something present in addition to the myopia. I have often found that boys at the school for the partially-sighted which I attend, whose vision with glasses was either about 6/60, or in some cases even less, on leaving school at 16, could see 6/12, or in one or two cases even more, and all that had been done was purely *negative* treatment, namely placing them in the

non-sighted or perhaps partially-sighted class. It is true that up to a point this treatment has had some measure of success, but it is purely negative, and does not remove the child from the partially-sighted category. In my opinion, the partially-sighted person is as great, or even greater, a problem than the blind, for on leaving school how is he to compete with the sighted, even if his vision remains stationary after he has escaped from supervision, or, as is much more likely, he descends into the blind category?

I am not claiming that all these cases are myopes with pseudo-myopia, far from it. Some may be, for it would seem that there are myopes who have a degree of amblyopia, which it should be possible to improve. Let me explain myself. Now why does the vision in these myopes deteriorate, although the myopia is not increasing; and why does the vision improve when reading, etc., is forbidden? Surely, their poor vision is due to suppression or amblyopia. If this proves to be the case, here is an opportunity for *positive* treatment, and the possibility of making them fit to compete with the sighted person on leaving school. I myself, rather like to use these two terms, amblyopia, and suppression for slightly different conditions. I like to use amblyopia for successful suppression, that is suppression without symptoms, and if there are symptoms, then I prefer the term suppression. There are some who appear to be using other terms such as "neglect" instead of suppression. This seems to imply that suppression is a negation, or omission to do something, in this case, to see. But is this really so? Is it not an act, unconscious it is true, but an act, commission if you like, to avoid doing something which is difficult or unpleasant? We none of us like getting our feet wet, but to avoid stepping in a puddle is surely an act, even if it is not consciously done? Then there is the type of suppression, which can be acquired by the refractionist or the bacteriologist. They will use one eye and suppress the other when using their respective instruments. I suppose the term neglect could be applied to this feat, but I am not altogether convinced that they "omit" to see with one of their eyes rather than "suppressing" it.

I have recently had a case which suppressed at a definite distance. This is a new conception to me, that suppression can be acquired at a particular distance, though really there is no reason why this should not be the case, and when I have described the details, I think that you will agree that it supports my suggestion that suppression is an act rather than an omission.

(10) The patient was aged 36 years, and complained of "black-outs" and headaches. She had concussion ten years ago, but had not been subject to headaches since then until quite lately. She was a driver in the A.T.S. Her vision was R. and L. 6/5, and her refraction plus 0.50 D.Sph. She was orthophoric on the

wing test, and could converge to 10 cms. Sim : Per : 0, Fusion obtained at 0, stereopsis was present, but adduction was only 6. She suppressed to a marked degree at "distance," and said that to rest herself after driving she would stare at something close, or would read a book. If she could do this for a sufficiently long time, she would feel refreshed. She responded well to orthoptic training. I have not seen any reference to suppression at a distance, though, when one comes to think of it, there is nothing very strange about it; it is only that the patient suppresses at the place at which his work is normally situated. As the majority of our patients are engaged on near work, for example, typists, clerks or bench-workers, it is only natural that most of them suppress for near objects, but I can well understand that the driver of a car would suppress at a distance.

Earlier I referred to photophobia, and I hasten to admit that I do not altogether understand the connection between suppression and photophobia, and I should like to know if any of you have had similar cases. In one of these cases the photophobia was very marked. When first seen she was a girl of 10 years of age. She had had acidosis when younger, and had had her appendix removed when she was seven. She also had had sinus infection, and her tonsils and adenoids removed. She complained of headaches. Her refraction was plus 1.0 D.Sph. and her vision was 6/6 or rather better. She had poor adduction. After twelve orthoptic treatments she had excellent ductions, was orthophoric and could converge well. Four years later she had marked suppression and very poor adduction. Treatment was again given with the result that there was a very fair improvement. She went back to school, and during the next holidays had further treatment, with further improvement, but summer was approaching, and photophobia began to trouble her. I have always been very reluctant to prescribe a tinted glass, unless there were very good grounds for doing so, but in this case I felt justified, and so ordered Crookes' B.1 glasses and also vitamin A; the latter did not seem to have any effect. She had further treatment in the summer holidays, and by the end of this course she had overcome the suppression for the first time. I am convinced that the suppression would not have been conquered, if the photophobia had not been alleviated, for the real improvement in the suppression started after the prescription of dark glasses. From this and other similar cases, which I have had, it would appear that there is some connection between suppression and photophobia, but I am far from certain what it is. I am inclined to think that the latter is a manifestation of the former.

To sum up these are the chief points :—

(1) All patients under the age of 16, should be refracted under atropine administered twice a day for three days. Especially is

this necessary in those myopes who accept a lens of higher power than their refraction would warrant, or would accept it on a subjective test. In some cases it may be necessary to use atropine for a fortnight, in order to get full relaxation of accommodation.

(2) In pseudo-myopia the vision may be variable.

(3) That investigation of the myopes in a school for the partially-sighted along the lines suggested might be profitable and might throw some light on the nature and treatment of myopia in the adolescent.

(4) That in those cases in which there are symptoms or signs suggesting the need for orthoptic training, the presence of myopia is not necessarily a contra-indication.

(5) That pseudo-myopia is possibly more common than previously supposed, and that it occurs in adults as well as in young people, and also in emmetropes and hypermetropes as well as in myopes.

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THE PROBLEMS OF GLAUCOMA*

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THE causes of glaucoma are still unknown, in spite of the considerable progress in science and satisfactory therapeutic results. Our knowledge today is the result of the work of generations, but in spite of its great value, we are well aware that the right solution is still wanting. The theories were always arrived at correspondingly to the discoveries in the histology of experimental pathology. It is neither advisable nor possible to do justice even in brief to all the opinions which have been expressed about glaucoma or to survey them all.

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