THE ECONOMIC ASPECT OF SQUINT AND A PROPOSED COURSE OF TREATMENT

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A THESIS SUBMITTED FOR THE DEGREE OF

DOCTOR OF MEDICINE

UNIVERSITY OF WISCONSIN

1935

Is squint worthy of economic consideration? To this question the ordinary persons, and even the uninformed medical man, will answer "No". The "squinter" is firmly convinced that he is at an economic disadvantage and so is the physician who understands the problem. I propose to show that the latter group of individuals is correct.

Kazdan has defined squint as a symptom complex in which there is a deviation of the visual axis of the two eyes, and in which there is a defective fusion faculty, which faculty is a coordination normally exercised by the higher brain centers. Worth, in 1903, first called attention to the latter defect, and he has considered it the essential etiological factor. When there is the proper coordination, binocular vision which is the physical blending of two sets of visual impressions from corresponding points on the retina, is insured. It is binocular vision which is lacking for the "Squinter". Worth further states that nearly all children are born with this faculty in an underdeveloped state, and that it is developed gradually in the first six months of life, so that by the end of one year it is well developed, and by the age of six, it is fully developed.

In addition to the two above mentioned symptoms, the squint complex usually adds a suppression of vision in the deviating eye. This is due to the fact that in normal binocular vision a single object is seen by the individual because of the fusion of two separate images by the brain centers. In the squinting eye, because a separate image is seen by each eye, and because these two images are not fused by the brain center,

a diplopia arises. This is not comfortable to the patient. Consequently the brain centers will unconsciously do something to overcome this, and the natural thing to do is to suppress one image. In the squinter the image suppressed is that from the deviating eye. After suppressing for a time, a habit is formed, the eye no longer sees the image, it becomes functionally blind, and another symptom is added to the squinting complex, and the latter is known as "Amblyopia Exanopsia".

It has been further observed that nearly all cases of squint have a refractive error.

There have been many theories arise in explanation of the probable etiological factors for squint. These may be summed up into few factors, each of which probably plays a part, namely -

1. The accomodation theory of Danders. The normal individual, while fixing on a distant object, rests his powers of accomodation and convergence. As the object moves closer, the two faculties come into play. In the hypermetropic eye, distant objects are out of focus. As a result, while at rest, some accomodation must be used. Then when the object is focused for nearer vision, the amount of accomodation required is that of the normal eyes plus the amount used while at rest. As a result, the stimulation sent is the accomodation center is very strong; and with the strong stimulus, a similarily strong

one is sent to the convergence center because of the fact that the two centers are so closely connected in the brain. The result will be an over convergence. When the refractive error is greater in one eye than in the other, a monocular convergent squint ensues. If equal, an alternate squint.

2. Worth's Fusion Theory. Worth believes that the cause of squint is a defect in the fusion faculty of the higher cerebral centers, which faculty normally insures binocular single vision. In presence of a well developed fusion faculty, equilibrium of the eyes is not easily upset. He describes three degrees of binocular vision:

    a. Simultaneous perception - the individual is conscious of two objects, one in the temporal field of each eye.

    b. Plane fusion: ability to fuse two retinal images, but seeing it as a flat picture.

    c. Stereoptic vision: A mental process. Relative position and depth detected.

3. Nervous Theory.

    a. Cases are caused by pathological nervous lesions.

    b. Functional nervous manifestations.

4. Muscle Imbalance Theory. There is an imbalance of the eye muscles so that their associated movements do not, by deviation of the two visual axes, place the object one is looking at on corresponding

points of the retina.

Above I have shown that squint is an actual objective physical deficiency. I shall now show that there is an added subjective physical deficiency, which is even more marked than the former.

Squint is a symptom complex which is prone to be considered very lightly by the general public. There are many reasons for this. First, the public has not been educated to the importance of the physical handicap of a squint. The usual person will look at a squinter, think him queer, "cock eyed" person and one with whom he doesn't care to acquaint himself, consider himself lucky that he is straight eyed, and think no more of it. The public has been educated to the value of the recognition and treatment of all other physical handicaps. Surely the squinting eye is a physical defect. It is as ungainly or more so to have a face crippled by a squinting eye as to have another bodily member crippled. In the first instance there is no possible means of hiding the defect as is the case of a person with a shriveled arm who may keep his arm behind his back. There is but one reason for the lax attitude the laity takes toward "cross eyes" and that is that the public has not been properly informed and educated to the actual consequence of the negligence toward squint. Nor has it become impressed with the necessity for treatment. The general public is not aware of the fact that most squinters have, in addition to the very marked cosmetic handicap, other far more grave handicaps. Few people realize that the deviating eye is usually an amblyopic eye, with an amblyopia exanopsia varying in grade from a

slight amount of disability to a functional blindness. These individuals have a vastly narrowed field of vision, and have little or no perception of depth. There is, then, no wonder that such an individual cannot readily secure an industrial position. He is an industrial hazard. Employers are awakening to the fact that a functionally blind eye is to all intent and purposes, a blind eye. Visual tests are now being made before a person can obtain employment.

In addition to the actual physical handicap of a squint, there are other subjective handicaps which are in truth more detrimental to the squinter. True, many fields of employment are closed to him because of a blind eye, but many more fields are closed to him because of a so-called "peculiar" personality. Why should this matter? All you need to do is to speak to an adult who has squinted, and he can tell you of the mental tortures he has suffered. As a young child he is called "cock eyed", "cross eyed", etc. Soon he comes to believe he is different from other children. He withdraws from his playmates. That causes more jibing and a vicious circle is formed. Children suffer very deeply and no child can stand the constant taunt of other children. His personality is changed. Little boys are prone to become pugnacious and little girls to become extremely self-conscious. The child is awkward, but he can not help it. His awkwardness is because of his poor sight. Parents are impatient because a little girl misses the tumbler when she pours the water at the dinner table. The parents do not realize that this is not carelessness or naughtiness, but simply a lack of the sense of depth and perspective.

With advance of time, the strain increases. The young individual may brood over the situation and maybe considered queer. His health as well as his psyche is emperiled by the withdrawal. Socially he can not meet people. He unconsciously holds his head down and does not look people in the eye. The cosmetic effect is particularly distracting to a young lady.

There is little wonder that such an individual will give a very poor impression when interviewing an employer. An employer wants people who appear honest, straight, forward and able to "buck up against the world". And then he too is somewhat prejudiced. He does not feel that a "cock eyed" person can add anything to his business, but will rather detract. He may feel sorry for the person, but that feeling cannot enter when dollars and cents are at stake. There are squinters, of course,who have overcome all these mental tortures, but that individual is rare, and it is asking too much of a person. With civilization as it is now, the normal individual has a difficult time with the keen competition of the day. The squinter just can't get into this competition because of his mental, his social, his cosmetic, and his physical handicaps.

This all seems very unfair when a few months or even a year's treatment as a child would have prevented the occurrence of the blind eye The individual with the squint is the sufferer, but he is not to blame. Had he been properly cared for as a child, this probably would never have happened. A parent would resent it greatly if he were told he had blinded his child, and essentially that is what he has done. When a

young person realizes the handicap he suffers, and the treatment he could have had as a child, he cannot be blamed for having a certain resentment toward his parents. But neither can the parents be blamed. Most of them do not realize their responsibility. It would seem then that the blame rests upon the fact that the public has not been informed of their duty. How is this to be overcome? The information must start with those who understand the situation and so quite naturally the medical profession must start the reform. There is but one way, and that is the same program that has been used for the control of such diseases as tuberculosis and small pox, namely public education. First of all, the general practitioner must be made aware of his responsibility. A careful family history should be taken from each prospective father and mother. If there be a tendency to squint present in that family, the parents should be warned to watch and be wide awake to the first sign of a turning eye. It is the family physician who sees the child at a young age. When he sees a squint, he should at once explain the situation to the family and warn them of the consequence of delayed treatment. He should be kind, patient, and sympathetic, and if he does not know the procedure to be carried out, he should send the parents to those who do. When an anxious parent comes seeking advice about a cross eyed child, never should the physician be guilty of saying "time will cure", or "lets give time a chance". That works only rarely. Each case should be treated expectantly.

Teachers and public health nurses should be made alert as to the early existence of squint. Frequently the teacher will be the first one

to notice it, because the child will be starting its first close work. In fact, the public as a whole should be educated to the fact that a squinting child is a neglected child. Physicians and parents alike should think not only of the cosmetic side of the problem, but also, and far more greatly, of the loss of vision. Never should the fact that a child is young and hard to handle be allowed to detain the treatment, nor should the extravagant claim of non-medical practitioners be listened to. With a medical profession, a nursing profession, a teaching profession, and lastly the parents all well impressed with the worth while results from a properly treated squint, the problem should be an easy one. The thanks and the satisfaction of seeing a squinting child grown into a worthy adult, one who can take his place in the competition, the world, the society of the world, and one who is good to look at, is pay enough.

Until recent times there have been two schools of treatment for squint; the operative and the non-operative. Now the two lines of reasoning are coming together and it is felt that the one is as important as the other. If it is believed that faulty fusion is the basic etiological factor for squint, then it follows that surgery will not cure the underlying cause. In order to keep the eyes perfectly straight after they are once put straight by surgery, the power of fusion of the two images seen is essential.

Because by far the greater number of squints are of the convergent monocular type, I shall confine this explanation regarding the treatment to that type.

The treatment of squint starts with the diagnosis. As previously shown, the responsibility of the early diagnosis rests upon those who first contact the child, namely the pediatrician and the family physician. The trend of treatment of which I wish to speak is that of visual training. The training must be given either as a complete treatment or as a supplement to surgical treatment. It is a specialized form of treatment and of recent origin. Of such important consideration has the method become that large medical centers are starting clinics. They were first started in the United Kingdom of Germany and the results in the conservation of eyesight have been so satisfactory and gratifying that more and more clinics have arisen. In the United States such medical centers as the University of Illinois, Northwestern University and the University of Pennsylvania have started clinics. Their reports are very favorable and they are rapidly enlarging their facilities.

I will outline in a brief manner a course of treatment such as that employed in the Illinois Eye, Ear, Nose and Throat Infirmary, which was started in September 1933.

1. Complete History.

This is very detailed and it is especially desirable to ascertain whether the squint is congenital or acquired.

2. Thorough Examination.

Objective.

a. Motility of each eye
b. Power of central fixation of each eye. Whether it can fix a light and hold it.
c. The character of the squint as determined by the cover test.

d. The angle of deviation for near and far vision, with and without glasses.

Subjective.

a. Diplopia and Maddax test
b. Vision
c. Fusion with amblyoscope or stereoscope.

3. Treatment.

Non-active

a. Refraction with cycloplegia

Active.

a. Orthoptic Incising
b. Surgery after three months training with inadequate results, and then after surgery more training.

It is very important that all squinting eyes should be refracted. By far the greater percentage of these eyes show a hypermetropia. This should be done as soon as possible. Then, in addition, the child should be well nourished, and should be generally speaking "Physically fit".

With these preliminary measures taken care of, the eye is ready for its visual training, and some type should always be given a trial. Worth first emphasized the importance of fusion training in 1903. He considered it effective only up to the sixth year, because he felt that by six years of age fusion is fully developed, and that after that time it can no longer be developed. Miss Maddox, in 1931, accepted older children and young adults for treatment. Although the latter group improved slowly, they usually have the will to go ahead, and they have been trained and Griffith of England reports the development of stereoptic vision in a

man 36 years of age, after four years of constant exercise. Otis Wolfe reports a case of a woman 46 years of age in whom fusion sense was reawakened. This latter is probably the oldest on record. This, then opens a new hope for the young adult who has become aware of the fact that he has an amblyopic eye. It gives a new courage and an incentive to try to do something.

POscal has described visual training as the developing and enlarging the visual capacity of an eye that has a subnormal amount of vision, and points out that it is largely a monocular procedure in contradistinction to orthoptic training, which latter is the developing and enlarging the capacity of the two eyes to work together as a unit, and in so doing establish binocular vision. He further states that the act of vision depends on retinal processes, the optic nerve, the mind, and the training in seeing. The latter two factors are mental and so have to be learned. In these cases seeing is to be developed either in an eye which has not learned how to see, or in one which has forgotten and has to be reawakened.

The first step is the development of a steady, sustained fixation by the squinting eye. Fixation is due to a mental urge. It is natural that the stronger the ureg, the more responsive the patient's eye becomes to this urge. The more responsive the patient is made to the urge, the quicker and more accurate the fixation movements will be. Therefore, the targets which are usually of flashing lights of varied types, should be at first interesting, bright, and of a nature to attract an eye.

There is a whole field of ingenuity opened here, because the trainer must always remember that the majority of his subjects will be young children.

Following fixation comes form vision. To develop this early, coordination of hand and eye should be learned. This is done by handling objects and then tracing them. In addition to this type of visual training, the deviating eye in which the vision is lessened or functionally gone is made to function by occlusion. Various means for this have been tried, as for instance atropine in the good eye, smoked glass over the good eye, or shielding the good eye with a bandage. With very small children the latter seems the preferable system. One hour a day is recommended by some, but as others point out, this is quite an inadequate time. Six to eight hours a day seems preferable, and it should be continued over three to six months, to do any good. It should also be done regularly to accomplish the desired effect. The child is given close work to do so as to really use the eye. If a mere infant, small colored blocks or balls may be given to it to play with. At all times, the procedures must be made as interesting to the child as possible.

Further treatment of the amblyopia consists in a thorough refraction of the eye with a good cycloplegia, as for instance atropine.

When it has been determined that a child has little or no binocular vision, the case is considered serious. He is treated at once in the orthoptic and visual clinic under trained and sympathetic supervisers. The first goal to be reached is the development of simultaneous

perception, or the ability to see two objects when looking through a stereoscope. Many varieties of instruments have been developed, and each worker seems to have added his own pet idea, but they are in reality all varieties of Worth's amblyoscope or stereoscope. At first primers are used in the stereoscope so as to straighten the sight, but these are gradually reduced and finally removed, so that there is ultimately fusion without the help of prisms. Careful observation of the eyes is always made through the front of the instrument, so as to make sure that there is no alternating of vision. Tracings are given the child. After the individual is able to see two objects, diagrams are put in the amblyoscope of such a nature that part of a picture is seen by one eye and part by the other. This allows for a fusion with some amplitude, and the eye will fuse the two distinct retinal images and see the thing as one picture. Both eyes have to take part in the process to see the picture as a whole. The psychic function is stimulated. It will be surprising how curious a child will become, and how he will try to see the picture as a whole. Again, the procedure must be interesting, the workers encouraging, and the materials of a nature that the child will be familiar with it. This much fusion having been learned, it is usually possible to develop a sense of depth perception. This is accomplished with the same instrument and with the diagrams also. Each eye sees the same object, but at a different angle. In depth perception, there is a physical blending of these dissimilar sets of visual impressions, so as to enable the patient to appreciate the solidity of the object, and aid him in the judgment of distance. In addition pegs are given which may be fitted in holes.

Each clinic has its own program of treatment. They are all essentially the same. To start with, the patient is treated one to two hours each week actively. In the meantime, occlusion training is carried out at home. If the case shows improvement by the establishment of fusion and the elimination of the angle of deviation, stereoscopic instruments and cards are given the mother to take home for the child. Careful notes of progress are made at each clinic visit. Training is kept up as long as improvement is shown. If, after three months, there is no improvement, surgery is done. It is felt that as soon as possible following surgery, exercises should be carried out as before. It is felt that the greater the angle of deviation, the less satisfactory exercises alone will be, and the greater the need for surgical help.

It has been estimated that the average length of treatment is from three to six months. Some improve in a shorter time. The older the case, the longer the needed time of treatment, is the concensus of opinion. Reports from various clinics are equally favorable. In all clinics, the treatment seems to have been started with a rather skeptical viewpoint as to the outcome, and in all cases very marked enthusiasm has followed. I shall quote for example, the results at Northwestern Medical School in Chicago.

Series I.

Forty cases with no orthoptic training. Refractive error corrected. Occlusion used. In six months 12.5% had squint corrected. In six months plus 25% had squint corrected.

Series II.

38 cases given training.

In six months 50% were corrected.

In six months plus 60% were corrected and of these less than 5% needed glasses.

In 84% of the cases with an angle of deviation of fifteen degrees or less, there was no squint after training. With a marked angle 37.1% cases showed no squint after training. Just these few figures would indicate that some type of training of an orthoptic nature is worthy of trial.

The physician should always be enthusiastic as to the outcome of the treatment, because at best, the training is prone to be long and tedious. The trainer should have a very pleasing personality, should be very good in handling children, and should make the work so interesting that the child will look forward to it.

CONCLUSIONS

1. The individual with a squint is at a real economic disadvantage.

    a. The squinting eye is usually amblyopic and to all intents and purposes a blind eye. When seeking employment, the squinter finds that all occupations, in which keen sight, fusion and perspective are essential are closed to him.

    b. There is a real cosmetic defect which is not to be forgotten, and of which an employer must be mindful.

2. There is a social disadvantage from which the squinter suffers even more tham from the blind eye.

    a. The squinter is very conscious of a cosmetic defect, and as a child becomes self-conscious. With the advance in years the mental agony increases. Stramge personalities may be developed.

    b. The squinter does not forget his cosmetic defect and is not himself in his social contacts.

3. All non-paralytic squints may be successfully treated and the ease and success of treatment varies immensely with the age of the individual. It consists of a combination of two equally important fields - surgery and orthoptic trainimg.

4. If the general public be informed as to the recognition and consequence of a neglected squint, many squinters will be saved mental, physical and economic handicaps.

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Date

May, 14th., 1935