Clinical Lecture

ON

CONICAL CORNEA.

BY

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Morbid Anatomy and Pathology of the Affection: Treatment by Appliances and by Operation.

THE name of this disease at once implies the physical changes that the eye undergoes, and which so completely spoil it. There is no other important ophthalmic affection so likely to be mistaken as conical cornea. Indeed, I may say that it is certain to be overlooked, except by one who has studied eye-diseases, and the impaired vision it causes attributed to a wrong cause. In the very early stage, even an expert ophthalmologist may be deceived, if he be hasty in his examination, or careless.

The cornea loses its spherical form, and literally grows conical, not quite regular, but more or less undulated; but this is apparent only when highly magnified. When the conical change has reached its maximum, it is at once apparent to any one who knows the disease; but in the commencement there is only at a first view an appearance of increased lustre—a symptom, in connection with bad sight, that should always induce a profile examination of the eye, when, if the conical change be going on, it will seem as if a drop of water were placed on the cornea. The anterior chamber always looks large in proportion to the projection. In exaggerated examples, the apex of the cone may be opaque at the summit, and dotted; sometimes the iris is slightly tremulous. The ophthalmoscope is a very sure means of diagnosis in doubtful cases. I made out this fact several years ago. The defective sight of a young woman had been a puzzle to all who had seen her, and for a time to myself; and I was able by ophthalmoscopic examination to detect a degree of conicity so trifling, that in the first instance, and by ordinary inspection, it escaped my notice.

These are the ophthalmoscopic signs of it. When the front of the cornea is focused, the apex is remarkably brilliant; while the base, the part not in focus, is in deep shadow, through the darkened circle may be imperfectly seen portions of the retinal vessels.

I have been invariably told by patients that the first symptom showing something to be wrong was near-sightedness; and, as the disease usually appears between the ages of fifteen and twenty, such an alteration in the focal range at that time of life demands a strict scrutiny of the eye. Very decidedly impaired vision follows, and distant things are lost to view; objects are multiplied, and luminous ones have zones about them. The best sight is got by looking sideways, as nothing can clearly be seen through the apex of the cornea. As the affec-

tion advances, the eye gets quite useless. Instead of the rays of light being concentrated, as by the natural cornea, and directed through the pupil, they are bent and thrown off, and otherwise influenced by the mechanical changes in the part.

The affection has been seen at birth, and has occurred hereditarily; but ordinarily it does not appear till after childhood. The slowness of the progress is among its characteristics; but the ratio of increase is uncertain, and there may be an arrest at any stage of development.

We are in ignorance respecting any predisposing cause; and as to the direct cause, nothing satisfactory has been established. I mean this to apply to the genuine conical cornea, in which there is nothing but the transparent cone; and not to staphyloma of the cornea; nor to bulging from ulceration; nor enlargement, not very uncommon in strumous corneitis.

Respecting the structural alterations that take place, it has been observed by actual dissections, that the cone is thinner than the unaffected portion of the cornea at the circumference that is healthy, and that the greatest thinness is at the apex. Still more accurate investigation has found that the anterior elastic laminae on the apex is thinned, having beneath it a congregation of nuclei; also that the laminae of the corneal tissue proper are converted into a web of caudate and nuclear fibres, and, among the meshes, clusters of cells; and that these changes increased from the base of the cone, where it began in the healthy part of the cornea at the circumference, to the apex. No alteration has been detected in the posterior elastic lamina, nor in the epithelium.

The important question of treatment now arises; and I shall first consider what has been derived from the various appliances of art, optical and mechanical; and how it may be obtained. The object sought is to direct the light into the eye through the circumference of the cornea, the portion of it not yet diseased. The principle is, to expand the pupil beyond the base of the cone. The success, then, must depend on the amount of the cornea involved, the size of the cone, its angle and undulations; for, when these exceed certain limits, a case may be irremediable—a distressing condition, at which any individual progressive instance may arrive. And the duration of benefit will be according to the arrest in the disease. As it progresses, so must there be decline in the assistance that has arisen, whatever may have been the source.

Dilatation of the pupil by atropine is sometimes beneficial. It is effected by a drop of a very weak solution, varying in strength from a quarter of a grain to a grain in an ounce of water, according to the amount of dilatation desired and the susceptibility of the eye; and renewed every third or fourth day. However, this method of artificial dilatation is difficult to regulate, and the effect is most likely to be in excess. Then the atropine much interferes with the adjusting power of the eye.

But by far the most generally applicable pupillary influence is to be got through the natural expansion, by shading the eye; that is, shutting off the general stream of light with a goggle of some kind, and admitting rays only through a small slit, or a circular hole. It is in consequence of the very decided benefit that I was enabled to confer, a few weeks ago, by means of an appliance of this nature,

that I have put these ideas together concisely in the form of a lecture.

CASE. The patient was a female cook, aged 27, sent to me by my colleague Dr. Markham. For some time her sight had been impaired, and medical assistance sought; but neither the physical changes in the cornea, nor the peculiar disturbance of vision, were recognised. A great blunder was committed, and wrong treatment instituted. The cones were small, and that in the right eye was the larger; but I detected them at a glance. As usual, there was that indistinctness of sight which is almost invariably spoken of as "confusion". There was no definition of any distant object; friends could not be recognised a few yards off. The nearer a thing, the better it could be seen; and large type held very close could be made out; but the indistinctness and confusion affected everything, however near it was viewed. Concave glasses afforded no benefit. The use of atropine in the one eye made matters worse. I then tried the effect of looking through apertures of different sizes and shapes in a piece of metal, and soon discovered that type which could not be deciphered with the naked eye could now be read. Moreover, there was much gained in focal range, and in distant definition. Things in the street, that before could not be recognised, were now readily named. The contrivances decided on were two bowls of metal, like the bowls of a teaspoon, with slits in them, united in front by a nose-bridge, and kept on by an elastic band around the head; and, as being more slightly for out of doors, a pair of ordinary goggles, with crape rims and neutral tint glasses the sides of which were made opaque by a circular piece of plaster stuck behind them. I was satisfied that the first gave the best vision, although the second were the easier to wear, and looked better.

It is quite incredible how much pains, care, patience, and time, are required to find out whether a patient can derive assistance, or cannot, by any of these means; and if he can, what is the highest attainable amount. And, so far as my own experience goes, the optician generally shirks to the utmost the trouble that all the trials and the alterations of the several contrivances impose on him, and which is not to be wondered at. However, in this instance, I found a remarkable exception in Mr. Millard of 334, Oxford Street. Supposing the disease in this case to progress, as most likely it will, and we have no power to check it, the woman is still very materially aided, perhaps for years. Should it be stationary, she has had as much done for her as art and science of the nineteenth century can afford.

I have made an allusion to concave glasses. I must tell you that occasionally very deep ones afford help in the early stage of the affection. I met with a gentleman who discovered that by having his spectacle-frame bent at the bridge, so as to place the glasses at certain angles to the eyes, he could see better.

Now, let us see what practical surgery can accomplish. If we could rely on what the authors of the several procedures advocated tell us, there are several perfect cures. But most of them have not survived the life of their originators. It is scarcely possible to conceive anything that has not been tried, even to so absurd a measure as removing the lens; but I shall not recount them, but direct attention at once to the only measure that has, according to my observation, proved trustworthy; and I do not think any could be named that I have not fairly tried.

An artificial pupil—that is, drawing the pupil

away from the centre of the cornea, the part spoiled by the cone, to the margin, the most perfect part, and displacing it there—is an operation admissible under certain circumstances, and to be recommended. To the late Mr. Tyrrell is due the merit of suggesting this. Sometimes he cut off a bit of the iris, sometimes he strangulated it in the corneal wound. There can be no doubt that Mr. Tyrrell did sometimes meet with success—sometimes he did not; but this highly practical man did not discover the secret of his success. It has been reserved for Mr. Bowman to show that, to get the desired benefit, there must be only a mere slit-like aperture of pupil. The large lateral opening which ensues when a considerable portion of the iris is excised is useless. In all probability, it was only when Mr. Tyrrell "strangulated" and did not "excise", that benefit was got. In operating, too, with his hook, the form of the pupil much depends on the amount of the iris drawn out. It would make too long a lecture, were I to describe the details of the modern operation; and to those surgeons who are likely to put it in execution, and are not already learned in it, I beg to refer to my work on the *Surgical Diseases of the Eye*, for an ample description, with illustrations.

Now, the great practical therapeutic question that arises out of this, is to decide when the one or the other of these two means should be adopted. To develop some principle, however narrow, for guidance, demands a careful study of many cases with a scrupulously unprejudiced mind, together with some experiments, and not less to examine cases that have been operated on by other surgeons.

My own present conviction is, that in the earlier stages of conical cornea the greatest improvement to the imperfect sight will be got through expansion of the pupil by shading the eye; that the artificial pupil tells most in the advanced stages, when either so much of the cornea is involved as to leave too little space for the light to pass through the dilated pupil, or the form of the cone prevents it. Then, too, it is, that there is no risk to our patient of rather dimming than improving him, as does sometimes happen from the side pupil in the early stage. After an artificial pupil at the period I advocate, I have even found a concave glass materially to assist in clearing objects.

DESTROYERS OF SALMON-SPAWN. Not one salmon-egg out of a thousand ever comes to maturity as a grown fish. In the case of the salmon, a thousand evils beset it on its way to the shallow water, where it wished, if he might so term it, to make its nest. When in this condition it was called a foul fish, and was not eaten in this country; but, unfortunately, it was not only eaten, but very much liked in France, which offered a ready market for the poacher. When, however, the spawn were laid, the perils of the young fish began at once. There might be a drought, or their might be a flood, and either would destroy the eggs. Other fish ate the spawn; trout sometimes ate their own, and five hundred eggs had actually been hatched after being taken from the maw of a trout which had swallowed them. The larvæ of dragon-flies, and the little insect called the "water sweep," were great destroyers of the young eggs. The poor little water ousel was often shot for his supposed depredations on the spawn; but the real truth was that he never touched it, and only came to prey on the insects that had assembled to prey on the spawn. A bird that did a vast deal of mischief in the way of devouring spawn was the swan. (*F. Buckland.*)