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THE TREATMENT OF COMPLICATED ULCERS OF THE CORNEA.

A PAPER READ BEFORE THE FORTY-SEVENTH ANNUAL MEETING OF THE MEDICAL SOCIETY OF THE STATE OF PENNSYLVANIA.

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THE TREATMENT OF COMPLICATED ULCERS OF THE CORNEA.

By Clarence A. Veasey, A.M., M.D.

In a former paper* it was suggested that for all practical purposes corneal ulcers be divided into two great classes, the simple and the complicated. By a simple ulcer is meant one that makes its appearance as a small, superficial, grayish lesion of the cornea, with no marked tendency to spread and with slight inflammatory symptoms such as injection of the conjunctiva, moderate lacrimation, and perhaps more or less intolerance of light. By a complicated ulcer is meant one that is more or less extensive, that shows a disposition to spread rapidly and involve other portions of the cornea than that first affected, and which produces all of the symptoms found in connection with a simple ulcer in a markedly exaggerated form. In the paper above referred to the author discussed the treatment of the first class, or simple corneal ulcers. In the short time at his disposal to-day he will endeavor to discuss briefly those methods of treatment of the second class, or complicated corneal ulcers, that have proved to be the most satisfactory in his own work.

A corneal ulcer ordinarily presents itself

*The Treatment of Simple Ulcers of the Cornea. The Philadelphia *Polyclinic*, June 22, 1895.

as a small grayish spot, the surrounding portion of the cornea being more or less hazy. This haziness may be a solid infiltration in all directions around the ulcer, or the latter may be a central point from which numerous striæ pass in various directions. The eyeball is more or less injected, there is excessive lacrimation, intolerance of light, and pain, the latter sometimes being out of proportion to the severity of the lesion owing to the distribution of nerves in the anterior layers of the cornea.

In the treatment of complicated corneal ulcers we begin as in the simple cases, by searching for the cause and removing it if possible. We look for foreign bodies either in the ulcer itself or upon the under surface of the lids where they may have lodged, and by constant scraping of the cornea as the lids were opened and closed have caused a denudation of the corneal epithelium, resulting in ulceration. In the same way misplaced cilia and small growths frequently cause corneal ulceration. But by far the most frequent cause, especially in children, is intranasal disease extending upward through the lacrimal ducts into the conjunctiva and thence to the cornea; and in all cases in which this condition is found the treatment must be directed towards it as well as towards the ulcer itself.

In the local treatment it is better to begin with the employment of those remedies found to be of the greatest service in the treatment of simple corneal ulcers, as many of the more complicated cases yield to these alone. They are as follows:

1. *Moist Heat.*—In applying moist heat to the eye the object is to keep up a continuous uniform high temperature for some time at regular intervals, and this is done in the following manner: Several small pieces of lint or flannel about three inches in diameter are dipped into water as hot as the hand can be held in for an instant, or at the temperature of 120° F., and laid on the closed eyelids, three or four thicknesses being employed, as the heat is better retained in this way. In from one to one and one-half minutes these are replaced by others, more hot water being repeatedly added to keep up the temperature. Heat applied in this manner should be employed for fifteen to thirty, or even sixty, minutes at a time, and should be used from three to eight times a day according to the virulence of the ulcer.

2. *Cleansing Solutions.*—Immediately after using the moist heat, and between the applications if there be much discharge, the conjunctival cul-de-sac and the cornea should be thoroughly cleansed by means of some soothing lotion. For this purpose a saturated solution of boracic acid, or a solution of mercuric chloride (1:6000), answers the purpose very well, though solutions of other remedies may be preferred by others, as chlorine water, cyanuret of mercury, permanganate of potash, or formaldehyde. The latter drug in the strength of 1 part to 4000 has proved of the greatest service in those varieties of corneal ulcers having a tendency to spread with unusual rapidity and complicated with hypopyon, but must be employed at frequent intervals, namely,

every hour or two. Whatever solution is employed should be warm, and this temperature is readily secured by standing the bottle containing the solution in a basin of hot water for a few moments before using, care being taken to test the solution on the back of the hand before placing in contact with the eye.

3. *Instillation of Atropine or Eserin.*—A drop of a solution of the sulphate of atropine (four grains to the fluidounce) is dropped on the cornea two or three times a day, provided the ulcer be situated near its center. This combats any impending inflammation of the iris and reduces the general irritation of the eye, in this manner acting favorably upon the ulcer itself. But should the ulcer be situated near the margin of the cornea a drop of a solution of the sulphate of eserin (one-sixth or one-fourth of a grain to the fluidounce) may be employed instead. The latter promotes healing by stopping the migration of the white blood-corpuscles, by promoting absorption through dilatation of the ciliary vessels, and by reducing intra-ocular tension if this be elevated. It should be employed from three to six times a day, and as it possesses a tendency to cause congestion of the iris and ciliary body it is better during the time of its employment to counteract this tendency by instilling at night a drop of the solution of atropine. Should there be at any time any complication involving the iris or ciliary body the eserin must be discontinued and the atropine employed in its place.

4. *Protection.*—The eye should be pro-

tected by dark glasses or a bandage. If much discharge is present it is evidently improper to dam it up in an already inflamed eye; in such a case dark glasses being preferable. If the amount of the discharge be small a well-applied bandage will materially assist in the reparative process, it being left off long enough for the application of the other remedies. It should be applied lightly but firmly, and should keep the lids closed and at rest without making any pressure on the eyeball, unless this should be required. It also keeps out such extraneous matter as dust, and should be worn until the floor of the ulcer is covered with epithelium, which protects it from external irritation.

Should the ulcer seem disposed to spread rapidly, to become more virulent in action, and to involve greater destruction of the corneal tissue in spite of the faithful employment of the above-mentioned remedies, our measures for checking its progress and producing resolution must necessarily be somewhat more severe. In the order in which they are employed they are as follows:

5. *Curettement.*—The ulcer may be curetted by an instrument specially devised for this purpose, or if this is not at hand it may be done more or less perfectly with a sterilized probe on the end of which has been wrapped a wisp of aseptic absorbent cotton. The cornea is first anesthetized with a solution of cocaine, or eucaine, after which a drop of a two-per-cent. solution of fluorescin is instilled and the excess washed off, this substance having the power of coloring the ulcerated portion light

green, while the remaining portion of the cornea having its epithelium intact remains unchanged. The use of this preparation, therefore, is of decided advantage, as it maps out for the operator the exact portion to be curetted and enables him to avoid injuring the healthy parts of the cornea. The sides and back of the ulcer are relieved of the slough as far as possible, and after a drop of the atropine solution is instilled some finely powdered sterilized iodoform is dusted upon the cornea, and a light pressure bandage applied. This is repeated if necessary on the succeeding day. Recently the author has also obtained some excellent results from the use of finely powdered acetanilid employed in place of the iodoform.

Hydraulic curetting as a method of treatment has recently been suggested, and it is carried out by having a receptacle containing the antiseptic solution to be employed held on a higher level than the eyes, while a nozzle with a fine point, connected with the former by means of a rubber tube, directs the stream for some minutes against the ulcer.

6. *Topical Application of Chemicals.* — If after a fair trial of the curette, the iodoform and the bandage, together with the use of moist heat, atropine, or eserin, according to the indications already stated, the ulcer should continue to grow worse, it is best to attempt to bring about a healthy condition by the application of some one of the chemical agents used for this purpose. The ulcer is first curetted in the manner described and the chemical agent is brought in contact with every portion of it by means of a wisp of

cotton wrapped on a pointed probe, or stick, previously sterilized. For this purpose one of the simplest as well as one of the best stimulants is the tincture of iodine. Stronger agents, actually cauterizing the parts, are solutions of silver nitrate (ten to thirty grains to the fluidounce), liquid carbolic acid, and strong solutions of bichloride of mercury (1:500). In applying these care must be taken to touch only the affected parts, as an application to the healthy cornea would result in an opacity of greater or lesser density; and as an opacity always results from corneal ulceration, except the most superficial, it must be our object to keep it as small as possible. After the application of the chemical agent the eye is treated as after curettement.

7. *The Actual Cautery.*—Among the more severe remedies at our disposal, when those previously referred to fail to check the progress of the ulcer, is the actual cautery, and in very few cases does the proper use of it fail to prevent the further extension of the disease. In the execution of this method of treatment we may employ the elaborate cautery outfits of the shops, if they are at hand, but a simple as well as most effective cautery probe can be had by inserting a piece of medium-sized platinum wire into the so-called "universal" laryngoscope handle. An assistant holding an alcohol lamp near the head, all draughts being avoided so that the flame will be steady, the end of the probe is brought to a white heat and quickly transferred to the ulcerated portion of the cornea, this having been mapped out by the use of fluorescin after the cocainization of the eye and the

eyeball being firmly held with the fixation forceps. As before stated the sides and base of the ulcer must be thoroughly cauterized, but care must be taken to avoid injury to the healthy tissue. Properly applied the actual cautery leaves a scar no larger than, if as large as, would have been the case if it had not been used; but improperly applied it increases the size of the corneal scar and therefore decreases in proportion the visual acuity. The eye is dressed as after the application of the chemical agents.

If at any time during the treatment of the disease the cornea threatens to perforate, as indicated by a slight bulging of the base of the ulcer, a bandage is evenly applied, making gentle but firm pressure; and if in spite of this the bulging continues to increase it is better to anticipate perforation by performing paracentesis of the anterior chamber through the floor of the ulcer itself if the conditions are favorable.

8. *Intranasal Treatment.*—In those cases having considerable discharge of mucus or muco-pus from the nares it is well to cleanse the parts several times a day with a mildly alkaline solution, such as Dobell's, one-fourth strength, and to follow with the insufflation of some of the following powder:

℞ Pulverized camphor, 30 grains;
Pulverized aristol, 10 grains;
Pulverized menthol, 20 grains;
Bismuth subcarbonate, 2 drachms.
Mix.

If the mucous membrane on the turbinated bones be much swollen it may be sprayed with a solution of antipyrin (ten to thirty

grains to the fluidounce), the parts then cleansed with the alkaline solution, and this followed by the spray of an oily preparation:

℞ Pulverized camphor, 30 grains;
Pulverized menthol, 30 grains;
Liquid petrolatum, 1 fluidounce.
Mix.

The topical application of the compound tincture of benzoin has also been found of much benefit in these cases.

If there is any gross lesion such as a polyp, a spur, or septal deviation, it must be attended to as early as possible, and this also applies to any disease of the lacrimal duct.

9. *Constitutional Treatment.*—As with disease manifesting itself in any other part of the body the constitution must be put in the best possible condition. Instead of confining patients to a darkened room, as a rule it will be better to allow them to pass several hours a day in the open air, the eyes being properly protected. Any particular diathesis that is present must be especially attended to, and in large, progressive ulcers the system must be supported by stimulants, and quinine administered. In the beginning it is advisable to give a brisk purgative followed by a saline draught. The diet must be digestible and nourishing, all sweets being interdicted. If pain is severe and continuous and not relieved by the means suggested above, the antineuralgics or even opiates are indicated.

In the preceding remarks those methods of treatment that have been of the greatest use to the author in the management of such cases are given in the order in which they are usually employed. It is impossible in the

brief time allotted to this paper to discuss the many complications that may arise during the treatment of a given case. No fixed rules can be made, but a general plan has been outlined, to be modified as emergencies demand.

Many other methods of treatment have been advocated by various surgeons, but brief mention will be made of only one, viz., the subconjunctival injections of solutions of mercuric chloride. As stated elsewhere, personal experience in the employment of these injections for the treatment of ulcerative disease of the cornea has not given to them the position of value to which they have been assigned by many ophthalmic surgeons. Experience in the treatment of a large number of cases during the past three years has shown that injections of a solution of sodium chloride beneath the conjunctiva prove equally as beneficial as injections of a solution of mercuric chloride, and that neither of them is of much value in the treatment of this class of cases.

To recapitulate, the treatment of complicated ulcers of the cornea should be carried out in the following order:

1. Examine thoroughly the conjunctiva, the lacrimal ducts, the nares and naso-pharynx, as well as the cornea itself, and if any abnormal condition be found that is either the primary cause of the ulcer or that is keeping up the condition, direct the treatment against it as well as against the ulcer itself.

2. Employ moist heat by means of the local application of pieces of lint or flannel wrung out in hot water at a temperature of 120° F. from fifteen to sixty minutes at a

time, repeating at intervals varying from two to four hours, according to the virulence of the disease.

3. Cleanse the ulcer and the conjunctival cul-de-sac with some warm antiseptic solution immediately after the employment of the moist heat, and between the times of its employment if there be much discharge. For this purpose may be used a saturated solution of boracic acid, a solution of bichloride of mercury (1:6000), or a solution of formaldehyde (1:4000).

4. Instil a drop or two of a solution of atropine (four grains to the fluidounce) once or twice daily if the ulcer be central; but if it be peripheral, a solution of eserin (one-sixth of a grain to the fluidounce) may be employed from three to six times during the day, and the atropine solution instilled once at night.

5. The eye must be protected by dark glasses or an evenly and lightly applied bandage. As a rule the former should be used in those cases in which there is considerable discharge, the latter in the cases in which very little discharge is present.

6. Should the above means fail to check the progress of the ulcer it should be curetted, and after dusting on its surface some iodoform, previously pulverized and sterilized, a bandage should be applied.

7. Should the ulcer continue to spread, after being curetted it should be touched with some one of the chemical agents employed for the purpose. Of these the tincture of iodine, liquid carbolic acid, and silver nitrate (the latter in the strength of ten to

twenty grains to the fluidounce) seem to be the best.

8. The actual cautery should be applied after the previously described remedies have been employed without beneficial result, or even before these have been used if it be seen that the ulcer has assumed a malignant type—that is, if the cornea is becoming so rapidly involved that the destruction of all, or a large portion, of its tissue is threatened.

9. Any unhygienic condition, dietetic error, or constitutional diathesis should be corrected.

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