

# American Journal of Ophthalmology

Series 3, Vol. 2, No. 1

January, 1919

PUBLISHED MONTHLY BY THE OPHTHALMIC PUBLISHING COMPANY

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## HEAT IN THE TREATMENT OF CORNEAL ULCERS.

From the first use of the actual cautery in the treatment of wounds down to the days of Pasteur and aseptic surgery, heat has been a reliable means of destroying infection. Increased knowledge of pathology and the recognition of pathogenic organisms have enabled us to apply it more exactly and effectively. But from the time when the cautery was first used to check supuration, the problem has been to do this completely with the least damage to the invaded tissue.

Since Martinache described his use of the actual cautery to check the progress of a corneal ulcer over 45 years ago, many instruments for such application of heat to the cornea have been employed, from the steel knitting needle held in an alcohol flame, or the copper ball to hold the heat with a projecting point to touch the ulcer, to the numerous forms of galvanic cautery tip mounted on handles of varied weight and convenience.

In 1892, Lippincott reported his fa-

vorable experience in the use of hot water dropped on certain corneal ulcers. He advised heating the water to 160° F., or over, and dropping it directly on the ulcerated surface.

In 1899, Bourgeois called attention to the sterilization of corneal ulcers by blowing hot air upon them. He used a bent metal tube attached to a rubber bulb, similar to those used by dentists to dry cavities preparatory to filling. The tube is held in the flame of an alcohol lamp and the air drawn back and forth in the tube three or four times and then immediately expelled against the surface of the ulcer, which at once becomes white. The process can be repeated as often as necessary.

Eleven years later he reported, that depending wholly on this method for the sterilization of infected corneal ulcers, his results were truly remarkable. Rozet reported a similarly favorable experience with the method; but it seems not to have been widely practiced. The cauterization by live steam which has been used in the frontal sinus by Dennis, seems not to have been tried for corneal ulcers. Boiling alco-

hol and other fluids that might furnish a perfectly definite temperature are also untried.

In 1910 Weekers published his method of applying heat to the cornea by holding the cautery point as close as possible to the ulcer without actually touching it. He first used an olive shaped cautery, in the manner afterwards described by Prince under the name of Pasteurization. But Weekers soon substituted the galvanocautery tip as the source of heat, pointing out that the temperature required for sterilization was about 65° C, or 150° F.; and that the needed color and proximity of the cautery tip to develop and sustain such a heat could be readily learned by holding the tip close to the bulb of a mercurial thermometer.

Lastly Shahan worked out his thermophore by which the metal tip, heated to a known required temperature, could be held in contact with the surface of the ulcer for the necessary time, one minute; making the application of heat more exact than had heretofore been possible.

To check a corneal infection it is not necessary to boil or char the organisms. It is only essential to raise them to such a temperature as will destroy their power of multiplication; and the temperature that will effect this is one that will not in the required time do any great damage to the cornea itself. The most important service that Weekers has rendered in this matter is his experimental showing of how little damage need be done to corneal tissue, by heat that will sterilize the pathogenic organisms. (See p. 90.)

The final determination of the best means of applying the desirable degree of heat, must await a considerable experience with the different methods on the part of the profession in general. The hot air method of Bourgeois is extremely simple and easily applied and repeated. But on account of the greater penetrating power of radiant heat, the methods of Shahan, and Bourgeois seem more likely to reach and render innocuous the more deeply seated organisms.

The treatment of corneal infections by heat will become more exact and its results more satisfactory in proportion as it is carried on with a clear understanding of exactly how much heat is needed and how much is being applied.

E. J.

## THE RADICAL CURE OF DACRYOCYSTITIS.

Chronic lacrimal sac disease is the *bete noir* of the Ophthalmic Surgeon, provided that he goes not at its cure by radical removal of the apparatus,—the last resort and to which nearly all cases should come.

True it is, that a certain proportion seem to recover after the nasal disease, particularly concomitant sinus affections, have been eliminated; and a few are cured by drainage with injections.

We have our choice of several radical methods of obliterating the sac:

1. The rhinolacrimal method of West and modifications, the intranasal operation; a somewhat difficult procedure largely advocated by the rhinologists.

2. Obliteration of the sac by caustics, recently resurrected by Gifford, who claims good and quick results from trichloroacetic acid. The writer's small experience with nitric acid in the old days and with trichloroacetic acid recently, has been that it is painful, causing edema and slow healing with prolonged after treatment.

3. Excision of the sac, preferably after the method of Meller, under local anesthesia by novocainadrenalin, when made by a master is one of the prettiest of all operations, and one in which the writer's experience gives full satisfaction.

Compensatory lessened secretion of mucous and lacrimal fluids certainly obtains after obliteration of the lacrimal canals; so that, except upon exposure to irritants as dust or smoke or winds that would make any eyes water, such patients do not generally complain of tearing, and in fact obtain relief from their watery eyes.

H. V. W.