

pended. I slit up the lower canaliculi at once, and incised strictures found at the junction of the sac and duct. The good effect was manifest almost immediately. Within six weeks from the time of the operation, I received letters from him, written at his home, in his own handwriting, informing me that he had resumed business, and was able to read coarse print. It is worthy of note that there had been neither epiphora nor swelling in the region of the sac, nothing in fact to call attention to the lachrymal difficulty. I continued to hear from the patient up to the time of his death, which occurred some years later. The good results persisted; his visual acuity improved still further, and in short, he regarded himself as a well man.

In forming an estimate of the relative value of the two methods under consideration, it is to be observed that by both, a permanent enlargement of the calibre of the duct is the object sought to be attained. In both, increased calibre can be secured only by structural changes in the walls of the duct. But in each, totally different principles as well as procedures underlie the results aimed at. By the process of probing—gradual dilation—the change is sought to be effected through absorption of the tissues forming the stricture, by means of the pressure of the impinging probe, with a redistribution of new tissue elements to compensate for the increased size of the duct. Such a process is slow and tedious at the best, and finally uncertain in its results, and for these reasons practically unavailable. Stricturotomy, on the contrary, at once effects an enlargement of the canal, giving the reasonable expectation of its permanent patency. It may be added that while the canal, as produced by stricturotomy, may be larger than is necessary for the performance of the normal functions of the part, it is certain that the space provided by probing is usually altogether deficient in size. The larger size, in the one instance, however, does no harm, while the small size produced in the other results in the failure of the operation.

In the light of all the facts, I feel warranted in stating my belief that probing as a method of treatment should be discarded. And, also, that stricturotomy, as here described, based as it is upon sound surgical principles and supported by experience, should be substituted for it, and all other instrumental procedures now in use for the treatment of stricture of the lachrymal duct.

Lachrymal stricture treated by this method has, in my hands, during many years, yielded results as satisfactory as those following operation in other parts of the body.

CLOSURE OF THE LACHRYMAL PUNCTA IN DACRYOCYSTITIS AS A BARRIER AGAINST INFECTION OF THE WOUNDED EYEBALL.

Read in the Section of Ophthalmology at the Forty-third Annual Meeting of the American Medical Association, held at Detroit, Mich., June, 1892.

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That an unsound condition of the lachrymal sac and duct is a constant menace to the eyeball and, in fact, the most mischievous source of infection, is admitted by everyone familiar with the subject. The pernicious quality of the secretion in dacryocystitis is

caused by the copious existence of microorganisms of many varieties, and with the exception of the gonococcus, none are known to be more hurtful to the tissues of the eye. The rule is therefore strictly observed, not to operate for cataract, etc., before any existing lachrymal trouble has been eliminated. Even the slightest corneal wound affords a favorable point of entrance for the virus, and hypopyum keratitis with all its dangers results. The striking fact has been proven that from 20 per cent. to 32 per cent. of the cases of hypopyum keratitis are complicated with dacryocystitis.¹

As a rule, a person afflicted with some disease of the lachrymal apparatus passes many years of his life without any further annoyance than a constant overflow of tears, which necessitates the frequent use of his handkerchief, and a discharge of muco-purulent secretion, which causes a sticking-together of the lids in the morning. Then, by accident, some foreign body produces an abrasion of the corneal epithelium, and the opportunity for infection is given. At first the eye becomes injected and inflamed and a small yellow spot with ulceration forms at the site of injury. Frequently it is not made much of until pain supervenes, the violence of which induces the patient at last to seek medical aid after several days have elapsed. The physician, frequently overlooking the lachrymal trouble, prescribes cocaine and hot fomentations with some antiseptic wash—but the eye grows worse from day to day. While the ulcer increases in size a yellow precipitate forms at the bottom of the anterior chamber; and it is often only at this stage, after the hypopyum has developed, that the oculist is consulted. It has been my experience to see the great majority of cases for the first time from ten days to three weeks after the injury had been inflicted. Speedy action is now demanded. Sometimes it is still sufficient to thoroughly scrape the floor of the ulcer, dust it with iodoform and to frequently flush the eye with a 1 to 2,000 sublimate solution, to which the use of hot fomentations is added when there is much pain. Cauterization of the ulcer, however, usually proves more beneficial, and it is now generally admitted to be the best means of destroying the germs and bringing about absorption of the hypopyum. But even this will frequently not obviate the necessity of a paracentesis or a Sæmisch operation. Only after the pus has been evacuated and the necrotic tissue eliminated does healing often begin, and after several weeks the eye recovers with a more or less large leucoma. But there is still a number of cases (according to different statistics from 9.5 per cent. to 19.2 per cent.²) especially in old and debilitated persons, where, in spite of the above treatment, the ulcer increases, staphyloma forms or the whole cornea is ravaged, and suppuration extends to the interior of the globe. It has appeared to me that, while all these active measures are being directed against the pus in the eyeball, sufficient attention is not paid to the source of infection, viz., the lachrymal apparatus. All our efforts may be entirely neutralized as long as there is a chance of renewed entrance of infectious material. To be sure, it is generally advised to add treatment of the sac and tear duct, to slit the canaliculus according to Bowman's teachings, to pass the probe and syringe the duct with antiseptic lotions. But

¹ Noyes, Diseases of the eye, page 366.

² Noyes, loc. cit.

we all know how long it often takes to cure dacryocystitis, if it can be cured at all, and before this is accomplished and the last pus germ eliminated, the eye may be destroyed. Even though we freely open the tear sac, evacuate its contents and treat its surface with strong antiseptic solutions, the source of trouble may be further down in the duct, or even in the nose. The importance of attention to intra-nasal lesions in obstructive disease of the lachrymal apparatus has recently been emphasized by Dr. de Schweinitz³ in a paper read before the Philadelphia County Medical Society. A number of cases are cited where intra-nasal treatment was necessary to cure the lachrymal trouble. But this also requires considerable time, whereas the infected corneal ulcer calls for speedy action. With regard to obliteration or excision of the lachrymal sac, it must be admitted that it would be the most efficient means of eliminating the virus. But it is quite a violent and painful operation, not to mention the time required for healing, so that the patient, now weak and debilitated by constant suffering, would hardly agree to submit to it. The question has, therefore, presented itself to me, if it were not feasible, after disinfecting all implicated parts in the best possible manner to quickly and effectually close the lachrymal puncta. Could this not be accomplished, at least temporarily, until the danger is over? Allow me to make my answer by shortly citing a few cases:

Case 1.—Mr. W. V., 63 years old, farmer, ten or eleven days ago while cutting corn something, probably a particle of a blade of corn, got into his right eye. It pained him at once and he tried to rub it out. The same eyeball had been inflamed twice before but recovered in a few days. As then, he made cold wet applications during the night and felt better in the morning. But the following day the soreness returned and gradually grew worse. In spite of several home remedies the increased pain began to extend to the forehead, temple and right side of head. Noticing, after a week, that the eye had almost completely lost its vision, he came to Wheeling and consulted Dr. I. P. Birney. The doctor at once applied cocaine and antiseptics, telling him the eye was probably lost, and on the following day, October 6, 1891, sent him to me. I found an extensive infiltration of the central portion of the cornea, in the centre of which was a small wound covered with pus. About one-third of the anterior chamber was filled with hypopyum, and on pressure over the inner angle of the eye a large drop of thick muco-pus gushed from both puncta. The man was very feeble and debilitated, as he had suffered intensely and not slept for three nights and days. I first thoroughly flushed the conjunctival sac and eyeball with a corrosive sublimate solution 1 to 3,000 and tried to empty the lachrymal sac as much as possible by pressure. After the instillation of cocaine and atropine I introduced a fine Bowman probe through the lower canaliculus, without slitting the latter, and a stricture was detected about half-way down the duct. After thoroughly washing out the sac and duct, as far down as possible, with a pyoctanin solution 1 to 1,000 by means of Anel's syringe, I scraped the floor of the ulcer and dusted the whole with iodoform. The existing chronic nasal catarrh was properly attended to and the usual directions given for home treatment. The following day less pain was reported, but the ulcer and hypopyum had increased somewhat, so I cauterized the former extensively, after which, for the next two days, it seemed to get smaller and pain less severe. While the treatment of the sac was constantly continued the discharge became gradually of a less purulent and more mucous nature looking exactly like the white of an egg. The hypopyum did not diminish, however, and the patient still had some severe spells of neuralgia. So I decided to make a Semisch operation. After the aqueous had slowly flowed off I managed to remove the hypopyum with an iris forceps. But in spite of all antiseptic precautions the corneal wound did not close, and after two or three days I found a yellow infiltration of its edges and pus beginning again to accumulate in the anterior chamber. While I was preparing to

cauterize the edges of the wound, it occurred to me to go further back towards the source of the trouble and see if I could ward off the lachrymal discharge by closing the puncta with the electro-cautery. After injecting cocaine, I pushed a fine wire about $\frac{1}{8}$ of an inch through the puncta and closing the current, brought the point to a red heat, which after a few seconds was slowly withdrawn. My expectations were realized, as the resulting burn of the mucous lining brought about a firm adhesion of the walls of the canaliculus. That the connection between the lachrymal and the conjunctival sac was now entirely interrupted was proven the following morning, when I found a slight swelling over the site of the lachrymal sac, light pressure upon which did not drive any discharge through the puncta. The corneal wound had a better aspect and under antiseptic applications the beginning hypopyum disappeared in another day. Repair began and the eye rapidly mended, while, at the same time, the swelling of the lachrymal sac increased very slightly. A week afterwards, thinking the corneal wound sufficiently closed, I reopened the lower punctum with a pointed probe and evacuated the accumulated mucous. The patient left for home the following day in good spirits, not caring about any further treatment of the lachrymal duct and nose, which I had advised. I have since learned that in spite of a large leucoma, the eye has regained a small amount of vision.

Case 2.—A. H., 42 years old, of Kingwood, W. Va. February 6, 1892, he was working on his farm with a hoe, when his right eye began to pain him; but he does not remember having been wounded. The same evening inflammatory symptoms became worse, and pain and headache continued to increase from day to day. He was treated at home for two weeks, and then came to Wheeling, when he was at once referred to me by Dr. Ackerman. Diagnosis: Advanced hypopyum keratitis. Small corneal ulcer at the inner quadrant, and the anterior chamber at least half full of pus. Profuse purulent discharge from both puncta, which the patient said had existed for many years without giving him much trouble, as he had always been able to empty the sac by squeezing its contents into the nose. The same treatment was at once instituted as above, only that I was able to syringe the whole duct, the antiseptic fluid escaping from the nose. The following day both puncta were closed with the red-hot wire, and a Semisch operation performed, which entirely evacuated the pus. The eye began to recover at once without any accumulation of muco-pus in the sac, as the patient was directed to keep it empty by frequently squeezing the contents into the nose. During that time it was peculiar to notice an increase of discharge from the puncta of the other eye. After ten days I reopened the lower punctum, and the patient, anxious to return to work, left for home after a sojourn of a little over two weeks. The resulting corneal scar was comparatively small, and he promised to return soon for further treatment of the lachrymal trouble. His physician has recently written me that his eye is doing well, epiphora being noticed only at times.

Case 3.—M. M., 48 years old. While breaking limestone, he noticed that his right eye became painful, and the following day vision had considerably diminished. He was compelled to quit work, and, as the pain increased, he came to see me May 1, 1892, five days after the first symptoms. I found an ulcer in the centre of the cornea, with surrounding gray infiltration. Slight degree of dacryocystitis, but no hypopyum. I cauterized the ulcer with the hot wire, closed the lachrymal puncta, prescribed hot antiseptic compresses and atropine, and the eye was well in less than a week.

With regard to the means of interrupting the connection between the diseased lachrymal passages and the conjunctival sac, I remember having read the description of a clamp which would tightly compress the canaliculi. But I have not had sufficient faith to try it, considering that the pus cell will manage to creep through the smallest aperture. Prof. Eversbusch⁴, of Erlangen, recently reported a method by which, in cases ready for cataract operation, where there was suspicion of a diseased condition of the lachrymal passages, he had closed both canaliculi with catgut ligatures. He declared thereby to have prevented all possibility of infection, which was proven by the good results obtained. The electro-

³ Journal of the Am. Med. Ass., April 23, page 526.

⁴ "Ueber die Anwendung der Antiseptica in der Augenheilkunde," Centralblatt für Augenheilkunde, December, 1890, p. 354.

caustic closure of the puncta, however, appears to be much simpler and surer.

Shortly after discharging Case 1, I found in the *Centralblatt für Augenheilkunde* the review of an article by Prof. Haab,⁵ of Zurich, in which he describes a procedure of closing the lachrymal puncta with the galvano-cautery, to prevent infection, before operating for cataract. His examination of cataract patients is completed in all cases by syringing the lachrymal passages, and whenever the slightest narrowing or discharge is detected, he closes the puncta with the electro-cautery the day before the operation. This, together with other proper antiseptic precautions, has enabled him during the past few years to remove a number of cataracts in spite of the presence of dacryo-stenosis, with excellent results. In fact, he declares that this complication, which is generally regarded as a *noli me tangere*, has now lost for him all its dangers. As I have a case of almost mature cataract, where the other eye was lost by suppuration after operation performed by another surgeon, no doubt resulting from still existing dacryocystitis, I intend trying this method, with the consent of the patient. Safety will be enhanced by postponing the extraction a day or two, until complete obstruction of the puncta is surely demonstrated. It would certainly be a benefaction not to be obliged to refuse such persons an operation, thereby condemning them to permanent blindness.

TREATMENT OF KERATOCONUS BY MEANS OF THE GALVANO-CAUTERY AND IRIDECTOMY.

Read in the Section of Ophthalmology, at the Forty-third Annual Meeting of the American Medical Association, held at Detroit, Mich., June, 1892.

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My object in presenting this subject is to get more light.

I have been unable to find any literature upon the subject which gives anything encouraging in the way of treatment.

In October, 1890, while a student under Dr. Knapp in the New York Ophthalmic and Aural Institute, it was my fortune to witness him treat a single case, with small central opacity, by paracentesis with the galvano-cautery needle. I did not see or learn of the results in Dr. Knapp's case, but accepted it as *theoretically* the most likely to give good results, and have tried it in two cases, the results of which I beg to submit for the basis of discussion.

As no definite results are reported, I have nothing with which to compare my results, but trust that they are at least worthy of consideration.

The literature on keratoconus is meager and widely scattered, so that it would be wellnigh impossible to present an acceptable review of the subject, upon which to base our remarks.

As to the cause of the disease we know but little or nothing, except that for a period ranging from a few months to a few years previous to the time vision began to fail, there is a considerable lowering of the vital energies from some cause or other.

As to the exact bearing this would have on the cornea, it cannot be definitely shown, but doubtless the condition present would be analogous to that which

in some other person would terminate in ulceration of the cornea (either superficial or interstitial).

The tension is not increased in the least, but on the contrary, it is diminished. In case the tension were increased the curvature of the cornea would be lessened, that is, the eyeball would become a more perfect sphere, and the cornea would no longer maintain the curve of a sphere having a shorter diameter than that of the eyeball. If increasing the tension will produce less curvature of the cornea, surely a subnormal tension must be present to *admit of* increased curvature. And upon examination the tension is found to be subnormal.

The course of the disease is usually slow; the first manifestation being failing distant vision. As the disease progresses there is greater impairment of vision, and in case there is interstitial degeneration the cornea will become hazy, and vision will be reduced to perception of light. The first manifestation of interstitial degeneration may be seen by means of strong oblique illumination (using a large lens). Fine lines may be seen at the apex of the cone, which resemble the lines on crazed glass; these lines increase in number and coalesce till they present the appearance of extensive interstitial ulceration.

This ulceration seems to be confined to the "*substantia propria*" and possibly the anterior "basal membrane," or what is known as the "scleral division" of the cornea, but cases have been reported where the cornea became so thin that they ruptured spontaneously.

The diagnosis in the early stage may be made by means of the ophthalmoscope or Placido's disc. With the ophthalmoscope the optic disc seems kite-shaped, as are also the rings of Placido's disc as seen reflected from the cornea. The parallax movements may be seen by moving either the head or objective lens. In the advanced stages, the deformity of the cornea is quite noticeable. The full front view of the eye presents a clear, watery appearance, due to the deep anterior chamber and the reflection of light from the surface. The profile view is similar to a cone, therefore the name keratoconus.

During the past six months it has been my privilege to have two cases (three eyes) of keratoconus under my observation.

The first is still clear, though the deformity is quite noticeable and vision is reduced to $\frac{2}{200}$.

The history is: Mrs. U., æt. 22 years, at 15 years of age was thrown out of a carriage on to the road by a runaway team, struck the right side of the face on the ground, both arms were broken, and was otherwise injured so that she was confined to bed for three months. After getting out she noticed the vision of the right eye was failing, and it has resulted in keratoconus.

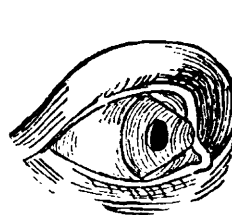


FIG. 1.

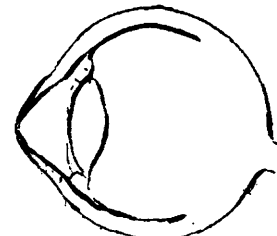


FIG. 2.

The second patient had double keratoconus. The right eye presented a very unfavorable appearance; the cornea protruded to the full extent possible (Figs. 1 and 2), the opacity extended on all sides of the apex so as to completely

⁵ Bemerkungen zur Staar Operation, November and December, 1891.