Result.—We now had the patient's jaw forward and she could open her mouth sufficiently for function, but, owing to the obliquity of the mental portion, the facial outline was still far from what was desired. The correction of this was a problem about which I had been thinking for some years. Three possible methods presented themselves to me: First, paraffin injection into the soft structures, which I dismissed early in the consideration; second, an osteoplastic resection to tilt forward a piece of the chin bone and fill in the space behind with a paraffin iodoform mixture, or silver frame and blood clot; and, third, the transplantation of cartilage. I finally settled on the latter procedure.

Second Operation.—On September 1, at the Washington University Hospital, under ether given through tubes introduced through the nose into the pharynx after the method of Crile, the mouth was packed and a cloth was sewed across the face below the mouth to prevent contamination from the mouth. The curved part of the eighth costal cartilage with its perichondrium was dissected loose and for temporary protection was left in its original position. Then a transverse cut to the bone was made in the crease under the chin and all the structures covering the front of the mental part of the mandible, including the periosteum, were dissected upward in one flap. The curved piece of cartilage one and a half inches long was laid on the bare bone and, after wiring it there, the flap of soft tissue, including periosteum, was replaced, and a very respectable chin resulted.

Postoperative History.—The whole wound suppurated, but I did not remove the sutures, and for days pus in large quantities poured out between them. Later the suppuration became less, and from local symptoms and appearance I came to the conclusion that the infection had occurred between the perichondrium and bone, which was a dead space, but not between perichondrium and the periosteum. Some sinuses persisted which healed nicely after the wires were removed and the sinuses had been injected with a paste of subiodid and subnitrate of bismuth and petrolatum, which is a slight modification of the plan introduced by Beck of Chicago for chronic sinuses. Later the x-ray demonstrated the bismuth in the space between the cartilage and bone. I preserved the perichondrium because it is in normal relation on the one hand with the cartilage and on the other with the soft structures: I thought that the leucocytes would be less likely to regard the covered cartilage as a foreign body, and that the nourishment of the cartilage would be preserved. I turned up the periosteum and buried the cartilage under it, because I thought that if I did loose the cartilage it might stay long enough to hold the periosteum in its new position until it had formed a shell of bone. Here I seem to have calculated badly, for the subsequent x-rays show no effort at bone formation on the part of the reflected periosteum. To my mind, the most remarkable thing in the whole procedure is that the cartilage did stay in place after suppuration occurred. The scar is linear and hidden well under the chin. The anatomic operative results in this case are the facial outline shown in Figures 11 and 12, a very fair occlusion of the natural teeth that have been preserved, and false joints that permit an up-and-down excursion of the lower jaw, which is limited by soft structures and which is increasing while a lateral movement is developing. A slight amount of the movement on the right side is in the temporomandibular joint, which seems to have been restored by the dilation with tents.

Dental Operations.—Dr. LeGrand Cox, who is associated with me in that clinic and who assisted me all through with this case, removed the upper incisors to allow the lip to retract and the remaining lower incisors and cuspids on account of their extreme malposition. He also crowned the lower bicusps to bring them up to occlusion. The prosthetic work which shows in Figure 13 was done by Dr. F. A. Niehoff, who has charge of that laboratory, and it and the casts do great credit to his skill and patience. The treatment extended over a year and the patient's circumstances were such that much of the time she was, by the courtesy of the dean, in the hospital at the expense of the dental department. Since the movement of the jaw has been restored and the teeth have been

replaced, on ordinary general diet, the sugar in the urine has disappeared. When the patient first presented herself, and all through the first months of treatment whenever she got out of the hospital and on general diet, it ran very high. This disappearance of sugar is possibly one result of the improved digestion, metabolism and spirits which have followed the operation.

Metropolitan Building.

GALVANOCAUTERY PUNCTURE IN ECTROPION AND ENTROPION *

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Ectropion and entropion, of mild degree, whether from interstitial shrinkage or from moderate cicatricial contracture, are so inefficiently remedied by our present operative measures that I have thought it desirable to present to the profession a simple procedure I have used for many years and from which I have never yet failed to secure the desired results.

There are many conditions which we can relieve by this procedure:

- A. Spastic entropion or ectropion.
- B. Senile or relaxed ectropion or entropion.
- C. Paralytic ectropion.

Fig. 1.—Galvanocautery handle and tip for galvanocautery puncture operation in ectropion and entropion (one-third reduction).

Fig. 2.—Ziegler's lid clamp for use in galvanocautery puncture of the eyelids either on conjunctival or skin surface.

- D. Contraction from lachrymal irritation.
- E. Moderate cicatricial contraction.
- F. Small cicatricial distortions or dimplings.
- G. Cases of distichiasis.

Many varieties of suture operations have been employed to relieve these conditions, but, while successful in some instances, they are quite inefficient in the larger proportion of cases.

The plastic operations often leave a scar, which is more disfiguring than the original lesion, and is, therefore, distasteful alike to both patient and surgeon.

The use of flexible collodion has proved of some value in spastic entropion following operations requiring the use of a compress bandage. A few galvanocautery punctures, however, will prove far more efficient in relieving this class of cases.

INSTRUMENTS

The method I desire to propose requires but two instruments, a short galvanocautery point (Fig. 1), and a lid clamp (Fig. 2). The galvanocautery point should

* Read in the Section on Ophthalmology of the American Medical Association, at the Sixtieth Annual Session, held at Atlantic City, June, 1909.

be short, rather thick and sharpened at the point so that it will puncture quickly. This avoids scarring. The lid clamp is a modification of my chalazion clamp, having a straight edge, which is a perfect guide for the row of punctures. It is made with a sliding catch, instead of the Desmarres screw, which facilitates placing it in position. The clamp makes a bloodless operation, and, to a certain degree, benumbs the tissues and so lessens the pain. If no clamp is available, the ordinary Snellen lid spatula may be slipped under the lid and the margin of the lid held flat by the fixation forceps or by a double lid hook, in cases of entropion. The same method may be reversed in ectropion, the lid spatula being placed outside on the skin surface, and the margin drawn away from the eye by the forceps or lid hook, which is then turned back flat over the lid spatula.

ANESTHESIA

I usually employ nothing but a 4 per cent. solution of cocain on the conjunctival surface, the pressure of the clamp causing some anesthesia. The patient may wince a little because of the glow of the cautery, the

Fig. 3.—Lid clamp adjusted to case of ectropion, showing row of galvanocautery punctures on conjunctival surface.

Fig. 4.—Lid clamp adjusted to case of entropion, showing row of galvanocautery punctures on skin surface.

Fig. 5. (Case 3).—Spastic ectropion following cataract extraction.

slight smoke and the momentary noise of sizzling or frying flesh, but ordinarily very little complaint is made.

In nervous, sensitive patients deeper anesthesia is required. Hypodermic injections of cocain under the skin, or conjunctiva will often increase the local anesthesia. In entropion the skin of the lid may be slightly frozen by a spray of ethyl chlorid. In the majority of cases, however, it will be necessary to employ nitrous oxid, bromid of ethyl, chloroform or ether. If ether is used it must be removed before the approach of the hot cautery point or an explosion will naturally occur.

DESCRIPTION OF OPERATION

The lid clamp is adjusted with its straight bar 6 mm. from the lid margin (Figs. 3 and 4). The galvanocautery point is applied to the surface with considerable pressure, the button on the handle is pressed down to turn on the current, while the point is quickly pushed through the cartilage and as quickly withdrawn. The

punctures are made 4 mm. from the lid margin, and separated from each other by an equal interval of 4 mm. These should be made on the side on which we wish the contraction to take place, viz., the conjunctival surface in ectropion, and the skin surface in entropion. If necessary, we can repeat the procedure in a few weeks. From one to three sittings will accomplish as much as a plastic operation would do.

This procedure possesses the double advantage of causing vertical contraction of the relaxed lid, and at the same time producing shrinkage and shortening of the redundant length of the lid, thus restoring the lid to its normal position.

POSTOPERATIVE REACTION

I have seldom seen any reaction. If, however, there should be cellulitis and puffing of the lid, the application of continuous ice pads for a day or two will control this condition. I have seen one case (see Case 10) infected by the discharge of a purulent dacryocystitis. I controlled this by wrapping a small wisp of cotton on a wire applicator, dipping it into a 1 per cent. formalin solution, and twirling it around slowly in each puncture. This application was made for three successive days, in addition to the ice padding, when all signs of sloughing disappeared and healing occurred without a scar. Every case, of course, exhibits the charred eschar of the cautery but this causes no disturbance and usually clears off in about a week.

REPETITION OF THE PUNCTURE

If the result is not immediate it may be necessary to repeat the operation two or three times at intervals of from two to four weeks, depending entirely on the amount of incurvation or turning to be overcome. As the procedure is under perfect control, the judgment of the operator can easily determine the number of punctures necessary to attain the desired result. In cases requiring repetition it will be better to make the punctures alternate, locating the second series between the first series.

REPORT OF CASES

I desire to relate briefly a sufficient number of cases properly to illustrate the lesions under consideration and to demonstrate the value of the galvanocautery procedure. The majority of these cases were treated at the Wills Eye Hospital, while a few were seen at the St. Joseph's Hospital or in private. I regret that more

photographs of the patients were not taken in order to show more especially the results of the operation.

CASE 1. C. S. P., aged 75, suffered from senile or relaxed ectropion of lower lid, O. S., with lachrymal obstruction.

Oct. 9, 1898: Rapid dilatation, O. S.

Dec. 11, 1898: Galvanocautery puncture of conjunctival surface, lower lid, O. S.

Jan. 8, 1899: Galvanocautery puncture, O. S., repeated.

Feb. 1, 1899: Final galvanocautery puncture, O. S., which was followed by prompt and complete recovery.

CASE 2. W. T., aged 29, ectropion of lower lid from lachrymal irritation; obstruction of tear duct.

Nov. 1, 1905: Galvanocautery puncture of lower lid, O. D., and rapid dilatation of tear duct.

Dec. 9, 1905: Galvanocautery puncture, O. D., repeated.

Recovery was prompt and complete.

CASE 3. J. B., aged 66, developed senile or relaxed ectropion of the lower lid, O. S., after cataract operation. This was spastic in character.

Dec. 9, 1905: Galvanocautery puncture, O. S., followed by rapid recovery which has been permanent. The original condition is well shown in the cut, Figure 5.

CASE 4. T. R., aged 42, ectropion of lower lid with lachrymal obstruction, blepharitis and epiphora, O. S.

Jan. 3, 1906: Galvanocautery puncture, O. S., followed by Stilling's operation and insertion of lead style. The recovery was prompt and complete.

CASE 5. F. T., aged 46, cicatricial entropion of lower lid, O. S., following burn by acid, which also occluded the tear duct.

Jan. 11, 1906: Stilling's operation with lead style O. S.

Jan. 17, 1906: Galvanocautery, puncture, O. S., which drew the lid out to its normal position, the convalescence being very rapid.

CASE 6. W. H. B., aged 48, ectropion of lower lid, O. S., from lachrymal irritation, with occlusion of tear duct.

May 14, 1906: Galvanocautery puncture, O. S.

May 29, 1906: Puncture repeated.

June 25, 1906: Rapid dilatation of the tear duct, O. S. Figure 6 shows the condition before operation, May, 1906,

CASE 8. A. L., aged 33, entropion with trichiasis and lachrymal obstruction.

Nov. 1, 1907: Rapid dilatation, O^s.

Nov. 11, 1907: External canthotomy, O^s.

Nov. 22, 1907: Galvanocautery puncture of skin surface, which relieved the entropion and trichiasis.

CASE 9. D. S., aged 75, entropion with trichiasis of both lids, O^s, the sequela of trachoma; lachrymal discharge with pannus, xerosis of conjunctiva.

Nov. 11, 1907: Galvanocautery puncture of skin surface, O^s.

Fig. 6 (Case 6).—Ectropion from lachrymal irritation.

Fig. 7 (Case 6).—The same patient two years after operation.

Dec. 18, 1907: Galvanocautery puncture, O^s, which so completely corrected the entropion and trichiasis that I was able to do a combined cataract extraction in O. S. two months later.

CASE 10. T. T., aged 55, had both eyes burned by an explosion thirty years before the time of operation; had entropion, trichiasis, dacryocystitis and pannus in both eyes; also had traumatic pterygium, O^s, with cicatricial bands in O. D., which held the eye in a divergent position.

April 1, 1908: Pterygium excised; Stilling's operation with lead style in both eyes.

April 6, 1908: Galvanocautery of skin surface for entropion of upper lid, O^s.

April 22, 1908: Division of cicatricial bands of upper lid by galvanocautery incision, O. D., which freed the eye from its divergent strabismus.

April 24, 1908: Galvanocautery puncture repeated in both eyes.

May 8, 1908: Galvanocautery puncture repeated, followed by infection from dacryocystitis, which was controlled by applications of 1 per cent. formalin solution, and ice padding. This is the only case of infection I have noted.

The ultimate result of these various procedures was excellent, and the patient was discharged greatly improved in appearance, with better vision and greater comfort than he had enjoyed for many years.

CASE 11. S. M., aged 67, has marked senile ectropion of lower lid with blepharospasm, O. D., dating back one year.

April 24, 1908: Galvanocautery puncture, O. D., conjunctival surface.

May 1, 1908: Galvanocautery puncture, O. D., repeated.

May 13, 1908: Galvanocautery puncture, O. D., the final result being a restoration of the lid to its normal position with relief of the blepharospasm.

CASE 12. W. W. G., aged 49, spastic entropion of lower lid, O. S., with lachrymal obstruction and ulcerative keratitis.

May 28, 1908: Galvanocautery puncture of lower lid, O. S., with rapid dilatation of the tear duct. The convalescence was prompt and complete.

Fig. 8 (Case 13).—Entropion and trichiasis before operation.

Fig. 9 (Case 14).—Congenital entropion before operation.

while Figure 7 represents the condition two years later, showing that the result has been complete and permanent.

CASE 7. C. H. A., aged 35, O. D. was injured by molten metal and enucleated. The patient had relaxed ectropion of lower lid, O. D., with shallow socket.

May 27, 1907: Galvanocautery puncture, O. D., conjunctival surface.

Nov. 4, 1907: Galvanocautery puncture repeated, which brought lid into good position for wearing an artificial eye.

CASE 13. Miss E. G., aged 34, suffering from entropion and trichiasis of upper lid, O. S., for many years.

June 10, 1908: Galvanocautery puncture for entropion of upper lid, O. S.

June 24, 1908: Operation repeated.

Figure 8 shows the condition prior to operation. The result was excellent but, unfortunately, the patient was discharged from the hospital without securing a photograph showing the final condition.

CASE 14. Miss R. G., aged 9, congenital entropion of both lids of each eye, with complete inversion of eyelashes; lachrymal obstruction.

Feb. 17, 1908: Rapid dilatation of both tear ducts.

May 25, 1908: Galvanocautery puncture of both lids, O^s.

June 29, 1908: Operation repeated on both eyes. Marked improvement.

July 8, 1908: Final puncture, which was followed by complete relief. Examination of the patient on March 8, 1909, showed that the result was permanent.

Figure 9 represents the condition before operation.

1625 Walnut Street.

ABSTRACT OF DISCUSSION

DR. S. D. RITLEY, Philadelphia: Any surgeon who has experienced the difficulties and uncertain results following the adoption of any of the usual surgical procedures for the correction of entropion or entropion will, I am sure, appreciate the simple method set forth in Dr. Ziegler's paper. The author has courteously afforded me the opportunity to see some of his cases. The admirable results led me to adopt the procedure in a man aged 68, who for a long time had suffered from entropion of both lower eyelids. A 4 per cent. solution of cocaine was instilled, the entropion was temporarily corrected by rolling the lashes outward through traction on the skin of the lid and a broad metal spatula was introduced into the conjunctival cul-de-sac. Pressing this forward drew the lid tight and held it firmly. Four galvanocautery punctures were then made as described by Dr. Ziegler. A week later the second eye was operated on in the same manner. The entropion in each eye was immediately and permanently corrected. In each a coating of collodion was spread over the punctures and the man was allowed to return to his home. There was no noticeable reaction and no scar. The immediate and perfect correction of the trouble were not only entirely satisfactory to both patient and surgeon, but afforded a rarely striking and brilliant result from a procedure of great simplicity. The principle involved is the shortening of the lid along the lower border of the cartilage on the outer or skin side in entropion and on the conjunctival side in ectropion. The placing of the punctures in relation to the edge of the lid is therefore important.

DR. WILLIAM ZENTMAYER, Philadelphia: When a new operation such as this is proposed we should have accumulative evidence of its effects as soon as possible; therefore, I wish to report six cases of the Ziegler operation, all done for entropion, four of the spastic type and two with trichiasis. The immediate effect was most gratifying. In two instances, one of the spastic type, it was necessary to repeat the operation and not sufficient time has elapsed since to warrant a statement as to whether the result is now permanent. But as Dr. Ziegler has said, repetition of the operation is to be expected. I have always injected cocaine into the lid before the operation and have had little complaint of pain. I do not know whether it is wise or not, but I have not even put a bandage on the eye. This is certainly an admirable procedure, in suitable cases.

DR. BARTON PITTS, St. Joseph, Mo.: In discussing the subject of entropion particularly, we must bear in mind that there are different conditions that bring about the turning of the upper and lower lids, especially the lower. Twenty years ago, in my experimental stage of evolution, I tried the cautery method quite extensively. In my part of the country we have 50 per cent. more cases of entropion than in the East. Trachoma is exceedingly prevalent, the population being made up of a considerable foreign element. I have obtained satisfaction from the cautery in only a very small class of cases, of spasmodic or senile entropion of the lower lid. In these cases one can cauterize; take out a small strip of skin or paint with

collodion and obtain a satisfactory result. Usually external canthotomy will afford permanent relief. There is no cauterization that will relieve entropion of the upper lid due to cicatricial contraction from trachoma, which constitutes 99 per cent. of such cases. In ectropion the operation of removing a V-shaped piece with the apex down at the external angle of the eye, and suturing it with one or two sutures has always proved effectual with me, except in cases with scar tissue due to injury or burns. Each of these cases must stand by itself. The operation for entropion most satisfactory to me is the Hotz operation combined with mucous transplantation from the lower lip.

DR. S. LEWIS ZIEGLER, Philadelphia: This particular instrument that I am showing was made for me by Luer, in Paris, but I am advised that the Keystone Electric Company, of Philadelphia, now has them ready. The cautery point I use is made very sharp on the end and then spreads out suddenly with quite a belly. One can, therefore, secure a good cautery effect and make the puncture very quickly thus getting heat without destruction of tissue. It should be borne in mind that you must not hold the hot cautery in the tissue too long, or there will be sloughing, as after any other cauterization. The other question, raised by Dr. Pitt I believe, was in relation to entropion after trachoma. Case 13, Figure 8, in my paper, shows a very marked case of entropion from trachoma of fifteen years' standing, that was relieved by this procedure. Unfortunately, no photograph of this patient was taken afterward. This operation is not supposed to take the place of all plastic operations on the lids, but is useful in eversion and inversions of moderate degree in which we do not care to do a plastic operation. It is also valuable in repairing or trimming up other plastic operations; in other words, if there is left some dimpling or distortion we can contract the lid on the inner or outer side, according to where the puncture is made. I do not think there is anything that I can add to the technique. It is very simple, and anyone who can use the galvanocautery can do it. So far as the after-treatment is concerned, I think any mild dressing will give the result. If one is afraid of puffing of the lid, ice pads may be put on for twenty-four hours. One can apply a bandage or leave the eye open. I seldom use any dressing, as the galvanocautery puncture should give no more reaction than the same puncture applied to a wart on the hand. I have illustrated the operation for convenience on the lower lid, but it works as well on either lid. The degree of anesthesia depends entirely on the individual patient and should be controlled by the circumstances.

TENOTOMY OR ADVANCEMENT*

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When Dieffenbach and his contemporaries began to operate for heterotropia they always divided the tendon of the muscle, or even the muscle itself toward which the eye turned. Naturally many of these eyes soon turned quite as far out of place in the opposite direction. Then operations for advancement were attempted, although at first only in a crude form. During the three-quarters of a century since that time ophthalmologists have differed in their opinions as to when to make tenotomy and when advancement. We have the important fact that thousands of eyes have been satisfactorily straightened by tenotomy, and, on the other hand, we know the unsatisfactory results of this operation which come to even the best operators, and the theoretical reason for advancement—that it is always better to strengthen one muscle than to weaken its opponent. An examination of the literature seems to indicate that when some attractive form of tenotomy has been proposed, ophthalmologic opinion swung toward

* Read in the Section on Ophthalmology of the American Medical Association, at the Sixtieth Annual Session, held at Atlantic City, June, 1909.