4. The anterior vesical wall can be reached best by inserting a retractor, 2.5 to 3 cm. in width, into the bladder through the incision and then using it to draw the incision down to the vaginal orifice, producing a displacement of 4 or 5 cm.

5. A beautiful means of inspection of all the parts of the bladder is afforded by means of a large cylindrical speculum about 12 cm. in length and about 3 in diameter, with a large handle similar to my proctoscopes.

6. For operations on the vertex and lateral vesical walls the assistant's hand may be of the utmost service in pushing the bladder up into the vaginal wound; in this way a tumor or an area of ulceration at the top of the bladder can often be removed with as much ease as a growth in the anterior vaginal wall.

The closure of the vesical wound is most easily and quickly effected; I commonly use silkworm-gut sutures, applying the first one in the center of the cut.

The operator is not troubled by any bleeding in any stage of the investigation, as the blood all runs down into the bladder.

Since writing the above I have removed a papilloma measuring about 4 by 3 cm. from the right wall of the bladder behind the pubic ramus. By traction on the base of the mass I drew the tumor with the adjacent mucosa well into the vagina through the incision in the septum. It was then easy to transfix the pedicle well down in the sound vesical tissues; to tie both ways and remove the mass. A similar smaller mass was removed from the right side of the urethral orifice by applying a simple catgut ligature.

THE TREATMENT OF SERPIGINOUS ULCER OF THE CORNEA.*

CHARLES J. KIPP, M.D.
NEWARK, N. J.

More than twenty years have now passed since I first observed that certain cases of serpiginous ulcer of the cornea, in which no further progress was noticed after they came into my hands, presented the features I am about to describe, and since then I have not seen a case in which they were present that did not heal under very simple treatment.

From the margin of the ulcer straight or nearly straight lines, broadest at the ulcer and gradually tapering, diverge in all directions somewhat obliquely, through the parenchyma of the deepest layer. They never give off branches. The further end of these diverging lines are connected by grayish intermediate striae, of the same width throughout, and running at right angles to them. If present all around these intermediate linear opacities form a complete ring of the same form as the margin of the ulcer, but situated more deeply, and 3 or 4 mm. distant from it. Sometimes a smaller ring is seen between the outer ring and the margin of the ulcer. The cornea between the opaque linear opacities here described is cloudy but that outside of the outer ring is usually of normal transparency. An ulcer situated in the central part of the cornea with these striae well developed, may be compared in appearance with a spider's web. In all of the cases of this kind seen by me the ulcer was at least 5 days old. I have never seen the picture develop in cases under treatment. The opaque lines gradually disappeared as the ulcer filled up. A few years ago, I made no microscopic examination of the exudation on the ulcer,

but have done so recently, and while I have found the pneumococcus usually present in the progressive cases, I have been able to find but few in any one of the cases presenting the above-described features. I think I am justified in assuming that the ulcer in these cases has ceased to be progressive and that any treatment which involves further destruction of tissue, or the danger of anterior synechiæ is entirely unnecessary and should be dispensed with. I feel so sure of this that even in the cases in which blennorrhœa of the sac was present I have done nothing more in the way of surgical procedures than to split the canaliculus. In these cases the symptoms of irido-cyclitis are usually not very severe, and the hypopion rarely fills more than the lower third of the anterior chamber. As I have already said, such cases always got well, and the only treatment required was warm fomentation with boric acid solution and instillations of a mydriatic. In all cases I was able to break up the posterior synechiæ by a 1 or 2 per cent. solution of sulphate of atropin, repeated often during the first day and less frequently after that. In most cases I have tried to expedite the complete cicatrization of the ulcer by gentle massage with a salve containing a small quantity of the yellow oxid of mercury.

The opaque striae here described and regarded by me as an evidence of the arrest of progress, were first described, so far as I know, by Saemisch¹ in his famous chapter on the diseases of the cornea, and von Michel² in his description of the serpiginous ulcer of the cornea corroborates what Saemisch has said about them. Both of these authors describe the linear opacities as of common occurrence in such ulcers, but neither of these writers looks upon them as a sign that the ulcer has entered the retrogressive stage. I have seen these linear opacities so often that it seems exceedingly strange to me that men of such large experience as Fuchs,³ Schirmer⁴ and Vossius⁵ have never seen the intermediary lines encircling the margin of the ulcer. I may mention here that I have been unable to find any reference to these linear opacities in the description of serpiginous ulcer in any American text-book. Whether or not the diverging opaque lines are due to folds in Descemet's membrane, as Schirmer seems to think, or are due to cell infiltration, as is held by Schmidt-Rimpler,⁶ I do not know; their similarity in appearance to the opaque lines diverging from the corneal wound sometimes seen after cataract extraction, can not be denied, but I have never seen in such cases the ends of the lines connected by the intermediary linear opacities. To me the diverging linear opacities have always seemed to extend obliquely to the inner layer of the cornea, although Schirmer says that they are all in the same plane and in the deepest layer. I may say here, in passing, that I have seen precisely the same picture in cases of so-called abscess of the cornea, and in these cases also no further progress was noticed after the development of the linear opacities.

With regard to the treatment of the cases of serpiginous ulcer of the cornea in which the linear opacities above described were not present, I shall only say that I have given up Saemisch's incision, and rely almost entirely on cauterization by means of the galvano-cautery, for the arrest of the disease. Unless the ulcer is situated in the center and is more than 4 mm. in size, has a broad yellowish-white, raised arc or several small ones, and the symptoms of irido-cyclitis are very severe (large hypopion), I delay the cauterization for a day or two, use compresses wet with a warm solution of boric acid continuously, instill a solution of atropin,

* Read at the Fifty-third Annual Meeting of the American Medical Association, in the Section on Ophthalmology, and approved for publication by the Executive Committee: Drs. Frank Allport, H. V. Würdemann and J. A. Lippincott.

and perhaps dust some finely pulverized iodoform on the ulcer once daily. Lately I have used, with apparent advantage, an ointment composed of bichlorid of mercury 1 part to 500-1000 parts of the sterilized vaselin. If the injection of the ocular conjunctiva is intense and the patient suffers great pain, I abstract blood from the temple, either by natural leeches or by the artificial leech. If I find micrococci in the advancing arc of the ulcer, or if the ulcer continues to spread under the treatment outlined, I use the galvano-cautery after having ascertained the extent of the ulcer by the instillation of fluorescein, and burn away the advancing arc as far as the greenish discoloration extends, and if the ulcer is very deep in any part, or the pupil has not dilated under the use of atropin or I think that the tension of the eye is above the normal, I perforate the deepest part of the floor of the ulcer at the same time. If, after a day or two, further advance of the yellowish arc is noticed I repeat the cauterization, but I have not been obliged to do this often since I destroy the corneal tissue as far as the greenish color, due to the fluorescein, extends. In cases in which the ulcer did not extend very deeply, but the irido-cyclitis was severe, I have sometimes made a paracentesis at the corneal margin with a view to reducing the intraocular tension and not for the purpose of evacuating the hypopion, which I regard as unimportant so far as the healing is concerned; but I do not think that these cases did as well as those in which I perforated with the galvano-cautery. The after-treatment is the same as in the milder cases already detailed. I have found that in cases of great pain due to the irido-cyclitis, relief has often followed the administration of salicylate of sodium and more recently the use of aspirin in 10-grain doses. Supporting treatment is, of course, required in nearly all cases. An examination of the urine should be made in all cases as soon as they come under observation, as I have found that in almost all of the cases in which the progress of the ulcer could not be arrested the patient either suffered from diabetes or nephritis. Treatment of these affections, if present, is of course required. In many of my bad cases I have noticed that the irido-cyclitis persisted in spite of all treatment, even while the ulcer was healing, and in some ended with closure of the pupil and secondary glaucoma, and in others cataract was developed. In nearly all of these cases the ulcer did not perforate, and no artificial opening was made, and I am under the impression that the artificial perforation, either by galvano-cautery or the knife, has a good effect not only on the ulcer but also on the irido-cyclitis, and I would recommend its performance in all cases in which the irido-cyclitis is at all severe.

With regard to the treatment of the blennorrhoea of the sac which is so often present in these cases, I have nothing new to offer. I usually split the canaliculus, and if the secretion is very profuse syringe the sac with a solution of bichlorid of mercury, 1:1000, once or twice daily. Otherwise I simply have the patient press the contents out of the sac every few hours. In a few cases in which a phlegmon of the sac was present I incised the sac and packed it with iodoform. I have never found it necessary to extirpate the sac in such cases while under treatment of the ulcer, although others have highly recommended this procedure. Attention to the nose, if disease is present should, of course, not be neglected. The presence or absence of the pneumococci in cases of *ulcerus serpens* is, according to Nellhagen,⁷ of great importance so far as treatment is concerned. According to this writer the cauterization and other ac-

tive treatment is required only if they are present. In three cases of large ulcers with iritis and hypopion and in one, which was, moreover, complicated by blennorrhoea of the sac, in which the pneumococci could not be found, the progress of the disease was arrested under warm application and atropin.

Dr. Paul Roemer,⁸ in a very interesting article recently published, holds out the hope that we shall soon possess a serum of the pneumococci, which will arrest the progress of the ulcer, when injected subcutaneously and applied locally and thus do away with the cautery which must of necessity increase the loss of substance and thereby increase the size of the resulting cicatrix. That he may succeed in giving us a serum that will accomplish this, and thus become a great benefactor of mankind is certainly the devout wish of all who know how often our present means fail to arrest the disease before much harm is done.

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DISCUSSION.

DR. GEORGE E. DE SCHWENITZ, Philadelphia—I would like to say that I consider it most unfortunate that we retain the name "serpiginous ulcer," as it gives us a wrong idea of what we are dealing with. So many ulcers are creeping that are not the serpiginous ulcer of Saemisch. I myself have not been able to see, as often as Dr. Kipp, the interesting distinction he makes between the ulcer with the arc of propagation, and the one with these radiating lines. It has been my practice to make my treatment correspond to the bacteriologic investigation. If the pneumococcus is shown to be present, I always use the actual cautery. In the vast majority of cases one gets a mixed infection and in a certain number of infected ulcers, a fairly pure culture of streptococcus. In the absence of virulent infection I use scraping, bichlorid, tincture of iodine and carbolic acid. I have also great faith in the use of iodoform in the manner Dr. Kipp has spoken of, placing it on the ulcer after scraping it. I have treated the sac just as Dr. Kipp has, slitting the canaliculus and washing it out with a strong solution of protargol. It has seemed to me that in cases where there is not a purulent disease of the sac some good has resulted by incising the palpebral portion of the lachrymal gland. I have done it a number of times with good results. In all the cases there was enlargement and swelling of the gland and it seemed to me that it lessened the amount of secretion, though this might perhaps have been a coincidence. I have incised the sac in some cases and it seemed to me with good results.

While I would listen with great regard to any recommendation made by Dr. Kipp, it seems to me it would be folly to treat an infected ulcer of the cornea by so mild and conservative a method as he advocates. I do not see how you can stop an infectious process except by getting rid of the source of infection. It must be remembered, too, in the use of fluorescein, that while it will color the ulcer, there is also a portion beyond that will also be colored: I do not know whether Dr. Kipp goes that far with his burning or not. I would say, then, that where I have pneumococcus infection I curette and use the cautery, associated with iodoform, and in other cases, where the infection is not so virulent, I use tincture of iodine or carbolic acid.

DR. N. L. WILSON, Elizabeth, N. J.—I have had some experience with this form of ulcer that was first pointed out to me

about two years ago by Dr. Kipp, and from Dr. de Schweinitz's remarks it seems to me that he did not exactly catch the doctor's idea. Dr. Kipp impressed upon my mind that when you see these radiating striæ connected at their ends by cross striæ you can make up your mind that the infection will extend no further and he therefore feels safe in treating them in a mild manner. My experience enables me to fully endorse what the doctor has said. The connecting lines are very fine and can only be seen by a good oblique illumination and a magnifying glass.

DR. EDWARD JACKSON, Denver—I would like to emphasize Dr. Kipp's view of the benefit of opening the anterior chamber, that it is by lessening intra-ocular tension rather than by getting rid of the material which escapes. In line with his observation that opening with the cautery is more effective than opening with the knife, I would say that I have noticed a good many times that it was necessary to reopen the original incision with a probe every twelve to twenty-four hours for some days. When allowed to close, as it tends to do with the exudate in the anterior chamber, the eye would get worse within twelve hours.

In the last four or five years I have used, with, I think, very decided benefit, an application that has not been mentioned yet—nitric acid. I have used it in what appeared to be a pure pneumococcus infection; and in those cases I think its effect was quite as marked and the improvement as rapid as in any cases in which I applied it. I use it by dipping a little piece of wood, like a match stick, into the diluted acid, from 20 to 50 per cent., diluted with distilled water, getting rid of any drop or excess on the end of the stick, and then pressing it into the area of softened tissue.

DR. LEARTUS CONNOR, Detroit—A remedy for the destruction of infectious germs has recently been presented to the profession by Dr. Novey of Ann Arbor, Mich., which may be used in these cases. In his laboratory experiments he found that solutions of acetozone as weak as 1:10,000 destroyed the gonococcus in a few moments and the most malignant of the other germs that we have to deal with. I have employed it in some cases of this kind and in cases of infected injury to the eye with, it seemed to me, great advantage. Without saying that, clinically, it will always act in that manner, it has seemed to do so in these cases. In solution of 1:200 it causes but little more irritation than the half-grain sulphate of zinc solution. As far as I know it has no injurious effect on normal tissue and I have put it into my own eye without any unpleasant effect. In the small experience I have had with its use so far I would say that it seems to me an agent to be depended on and worthy of extended clinical study.

PROF. HAAB, Zurich—I would like to say that I prefer to destroy the microbes of infection directly by using nitric or carbolic acid pure. I have had the best results in this way. Iodoform may be useful in the anterior chamber in some cases, but generally I prefer not to use it. Local destruction by use of the pure acid is preferable.

DR. H. G. SHERMAN, Cleveland—In using carbolic acid do you neutralize it with absolute alcohol?

PROF. HAAB—Of course, only a small quantity is taken on the tip of the probe, or a small piece of wood, and it applied only to the part most infiltrated you have no serious destruction of the tissue and can do it well without need of neutralizing. It is the best means of disinfecting these ulcers that I know.

DR. R. L. RANDOLPH, Baltimore—I would like to know what local anesthetic is used. I have long given preference to holocain in these cases. It would seem to me that the action of cocain tends to facilitate infection as we all know it causes a certain amount of exfoliation of the epithelium and this effect is seen in parts considerably distant from the ulcer. One would suppose that the proper thing to use would be an anesthetic which did not possess this property, such, for instance, as holocain. I not only use it at the time of operation but for some days afterwards. I agree with Professor Haab as to the value of the pure acid and that has been my routine treatment for some time. Carbolic acid has anesthetic

properties and while a local anesthetic is necessary before the application of the acid, the anesthesia need not be as profound as when other irritating applications—i. e., nitric acid, tinct. iodine or the galvano-cautery—are employed. I think holocain is of value throughout the treatment as it produces distinct pericorneal vascularization and in this way helps to carry off the products of inflammation.

DR. S. D. RISLEY, Philadelphia—I would like also to emphasize the value of holocain as compared with cocain as a local anesthetic in these cases and I am glad to have heard mentioned the method of using carbolic acid and iodine. I use a double-strength tincture of iodine, applying it on a fine-pointed probe, with a little cotton wool about it, and moving it around lightly over every portion of the infected area. There is an extraordinary power of dispersion or penetration in iodine and it is my favorite application. It has been many years since I have found it necessary to use the actual cautery in these cases. Certainly of next, or perhaps equal, value is pure carbolic acid. It has secondary anesthetic properties and I have never seen any unpleasant after-effects from its use. Both iodine and carbolic acid cause acute pain at first so that their application should follow the instillation of holocain.

DR. W. H. WILDER, Chicago—I also would like to testify to the value of tincture of iodine in these cases and am glad that Dr. Risley laid emphasis on it. I have been able to dispense with the cautery in many instances. Swanzy proposed the use of applications of absolute alcohol in superficial and hepatic ulcers of the cornea and the method has in my hands proven to be of considerable value, but I think one gets all the benefits of this treatment with the tincture of iodine, which can be thoroughly rubbed into the infected area. One point in connection with the use of fluorescein: After its application we quickly get the outlines of the ulcer well defined and it is important to begin the operative procedure immediately, as the area around the ulcer soon takes up the stain, and we then lose the sharp definition that is desired.

DR. J. E. MINNEY, Topeka—I desire to say that I have had some personal experience with the use of carbolic acid in these ulcers of the cornea and, unless there is a deadened area, it is just like sticking a red-hot needle into the flesh and I think a local anesthetic should be used before its application. It strikes me that we are all speaking of local applications only, and perhaps in the part of the country you gentlemen come from you do not need constitutional treatment, but in our part of the country we have to use quinin and we find that 2-gr. doses every hour are very beneficial. I use the pure carbolic acid as a local application, administer quinin, and advise that the patient be well fed and cared for.

DR. L. H. TAYLOR, Wilkesbarre, Pa.—We, of course, all have our own favorite methods for treating these cases. I have used the galvano-cautery very frequently and have come to rely on it more and more. I have also occasionally employed a strong solution of nitrate of silver after scraping the ulcer, but the cautery has given me the most satisfaction.

DR. HARRY FRIEDENWALD, Baltimore—I have been rather surprised to hear the tincture of iodine so well spoken of in the treatment of infected ulcers. For my part I have been very much disappointed in its use, even of the strong tincture, in infected ulcers. While I think it invaluable in dendritic and other superficial ulcers, as I said several years ago,¹ I have entirely abandoned its use in infected ulcers. I am very much afraid that some of the difference of opinion expressed is due, as one of the speakers has said, to the fact that we use the name "serpiginous ulcer" to cover different diseases. In my experience the tincture of iodine is only useful in ring ulcers, in dendritic and in other superficial ulcers of the herpetic variety.

DR. J. L. HIERS, Savannah—The local action of iodine, as is well known, is caustic and antiseptic. It is, likewise, a local stimulant and mild counter-irritant, promoting the absorption of inflammatory products.

Relevant to its application, the eye should be first cocaineized to complete anesthesia. This having been accomplished, intro-

1. Trans. Am. Oph. Soc., vol. ix, p. 129.

duce an eye speculum and scrape the ulcer thoroughly with a spud or equally convenient instrument. Dry the part well, then, with just a few fibers of absorbent cotton twisted tightly around an ordinary wooden toothpick, which has been previously immersed in the undiluted medicant, apply the iodine thoroughly to the ulcer. Care should be taken, however, to dry off the excess, and none of the drug should be allowed to come in direct contact with the healthy part of the eye. The organ should be subsequently bathed with sterilized water or boric acid solution, and treated as a recent traumatism of the cornea.

While at first it was my custom to resort to iodine in all simulating conditions, an experience of six years has led me to the conclusion that its special adaptability is to ulcers that are indolent in type. In serpiginous ulcers it lessens rather than increases scar tissue. For them, it seems to possess a peculiar affinity; over them, to exert a remarkable influence. The after-treatment should vary according to the indications of each individual case.

DR. ALLEN GREENWOOD, Boston—I desire to add my testimony to the value of iodine. I think it is one of the most valuable methods of treating these spreading ulcers, and I also want to endorse the use of iodoform. I do not think anything else will take its place in these ulcers. The opening of the anterior chamber is a useful method in ulcers following gonococcus infection. In the treatment of the serpiginous ulcer I would add the constitutional use of mercury.

DR. KIPP—I did not expect to hear much at this time confirmatory of the opinion that the features described show that the ulcer has reached the retrogressive stage. You find the lines diverging from the margin in all directions, but it is not so frequent that you see the lines that connect the ends. If the ulcer is in the center it gives the appearance of the spider's web, but if at the periphery the lines extend toward the center only and have other lines running between them. It is in this particular form that I think the progress has stopped and it is useless to use the cautery or carbolic acid. Carbolic acid was first used by Dr. Williams many years ago and in the same manner as mentioned here. I have used all the remedies named except nitric acid, and must say that I give the preference to the actual cautery. The advancing line is always undermined and you can bring your cautery underneath it. I use the cautery at a dark-red heat and limit its application to the advancing portion. With regard to local anesthetics, I have used holocain since it was first introduced by Hirschberg, but have found it very difficult to keep a solution in a good condition; it becomes opaque, a sediment forms and the solution changes to a pinkish color. In regard to the use of fluorescin, there appeared recently an article in the *Ophthalmic Review* by Benson, who has made a number of experiments with the use of it in connection with local anesthetics, and he has showed that after the use of a local anesthetic the ulcer discolored to a far greater extent than when the application was made before the use of the anesthetic, and this may account for my success, as I have burned away all of the raised arc as far as the greenish color extended. With regard to the use of supporting treatment, these ulcers occur nearly always in old broken-down people and, of course, some supporting measures are indicated.

DR. JOHN E. WEEKS, New York—I would like to ask Dr. Kipp what he considers the indication for abstraction of blood.

DR. KIPP—For the purpose of depletion and the relief of pain. I have seen many cases of iritis in which I could not dilate the pupil until I had abstracted blood in this way.

Handy Method of Disinfection of Sputa.—Gertler writes from Cracow to the *Wiener Med. Presse*, No. 11, that the following powder is excellent for scattering in cuspidors. It is harmless, kills all the microbes in sputa, deodorizes and rolls up into conveniently removed bunches. It is made by adding 15 parts of a saturated aqueous solution of copper sulphate to 100 parts of pulverized peat. After the mixture is dry, 2 per cent. formalin is added and enough aromatic essence to disguise the odor of the formalin. The whole is then mixed under pressure for an hour, when it is ready for use.

THE NATURE AND TREATMENT OF PTERYGIA.*

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Before proceeding to a discussion of the treatment of pterygium it would be well to consider the nature of the growth and the circumstances under which it develops. So eminent an authority as Prof. Fuchs speaks of pterygium as a growth peculiar to those past middle life, and while this may be true of Vienna and the country surrounding that city, it certainly is not true of the southwestern part of the United States, where I have been practicing ophthalmology for a number of years.

In this region, where we have the combination of summer heat from April to November, with a dry atmosphere agitated by high winds and impregnated with alkaline dust, we will find the ideal conditions for the development of pterygia. Consequently, it is not at all infrequent to see boys in that country afflicted with pterygia of small size, while among those who are older we see pterygia growing from both the inner and the outer canthus until they practically cover the entire cornea, reducing the vision to the dim perception of large objects. This tendency to pterygium is by no means the same throughout the region of the southwest, but is found especially in those districts where the conditions mentioned above are so abundantly supplied. In the southwest, embracing that territory lying between the Mississippi river and the Pacific ocean and between the Gulf of Mexico and the Mexican Republic on the south and the continuation of Mason and Dixon's line on the north, we have a vast variety of climates and of soils. And it has been my observation that patients coming from the still, warm, humid regions of the south are not so frequently nor so seriously affected with pterygium as are those coming from the warm, dry, windy and dusty regions of the same latitude. Heat, a dry atmosphere and high winds will cause the maximum degree of evaporation of moisture from any surface, and the combined influence will be felt upon any exposed mucous membrane. And when these factors are exerted almost continuously on the structures in the palpebral opening for many years and are reinforced by enormous quantities of alkaline dust, which clings to the eyeball about the sclero-corneal junction and the inner canthus and the outer canthus, and is not wiped away by the motion of the lids, but rather heaped up in the axis of the palpebral fissure, and when the evaporation of the tears is so rapid that they do not accumulate in sufficient quantity to wash away the foreign particles accumulating on the globe, then we have conditions most favorable for the development of pterygia, as experience has shown. And not only do we observe the difference in liability to pterygia among the inhabitants of different localities, but in any given locality pterygia will be far more frequent or much more severe among those who are exposed to the irritating effects of direct sunlight and wind and dust. And thus I find that I have many more cases of pterygia among ranchmen and farmers than I do among women and men of sedentary occupations, although the latter class will apply much earlier for relief on cosmetic grounds.

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