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Original Articles.

EYE COMPLICATIONS OF SMALLPOX.

SOME OBSERVATIONS DURING THE RECENT EPIDEMIC
IN CLEVELAND.*

ALBERT RUFUS BAKER, M.D.

Professor of Ophthalmology and Otology of Cleveland College of
Physicians and Surgeons; Oculist and Aurist of the
Cleveland General and St. Alexis' Hospitals.

CLEVELAND, OHIO.

The recent epidemic of smallpox was the severest in the history of the city, and has seldom been equaled in the number of cases and in malignancy in recent times, in civilized countries, as will be seen by the accompanying chart, which shows cases and deaths, prepared by Dr. Probst, secretary of the Ohio State Board of Health. The total number of cases for 1902 was 1,248, with 224 deaths. The death rate was 17.9 per cent., and, as Dr. Probst well said: "This was the genuine old-fashioned smallpox." Many of the cases were of the most malignant character and exceedingly contagious, unlike the mild form of the disease which hitherto prevailed.

The cause of this widespread epidemic is not far to seek. During Dr. G. C. Ashmun's incumbency of the Cleveland health office, from 1880 to 1891, the rule requiring vaccination of all school children was rigidly enforced; but since that time it has been followed more in the breach than in its observance, consequently a large percentage of the population were unprotected by vaccination.

The general indifference to vaccination was fostered by a few cranks, led by a certain doctor of divinity, who organized an anti-vaccination society, and the vaporings of this crank and his followers were kept perennially before the public in the newspapers.

From 1898 to 1901, inclusive, an epidemic prevailed in Cleveland of a mild variola. In 1898 there were 48 cases and no deaths; 1899, 475 cases and 3 deaths; 1900, 993 cases and 16 deaths, and in 1901, from January 1 to August 23, 1,230 cases and 20 deaths, making a total of 2,746 cases and 39 deaths during the four years. The mortality was less than .015 per cent.

During all these years there was a constant clamor in the newspapers about the evils of vaccination. Unfortunately, during the summer of 1901 some poor virus was used, and many badly infected arms developed. Several cases of tetanus were reported. A particularly sad one was that of a beautiful young lady who died of tetanus from the result of vaccination performed by her brother, a young physician.

This epidemic was terminated by a vigorous policy of vaccination and quarantine by Dr. Heimlich, who occupied the position of health officer for a short time, but whose strenuous methods did not meet the approval of Mayor Tom Johnson (unfortunately, the mayor is immune, having had smallpox when a boy). On one occasion, it is alleged, he said that he did not believe in vaccination, and no member of his family should be vaccinated with his consent.

Dr. Heimlich was deposed, and Dr. Martin Fredrick installed as health officer. He immediately commenced a vigorous crusade of house-to-house disinfection with formaldehyd.

Dr. Fredrick is a most efficient officer, a thoroughly educated gentleman, an indefatigable worker, with great patience and perseverance. He had placed at his command every resource to combat an epidemic without vaccination. A more competent man for such an undertaking could not have been found, and his complete and disastrous failure ought to be sufficient to close the mouths of every anti-vaccinationist in the country.

There ought to be some way of disseminating this failure of Dr. Fredrick's disinfecting crusade in 1902 as wide as the reputed success of his efforts in 1901, which did not prove anything, as the epidemic had already been stamped out by vaccination before he assumed office. There was not a single case of smallpox in Cleveland when Dr. Fredrick took charge of the health office. The paper he read before the Academy of Medicine on "How We Rid Cleveland of Smallpox"¹ was unfortunate in its title, to say the least.

The antivaccinationists quoted him far and wide as being opposed to vaccination; but a careful perusal of his original paper reveals that he believes thoroughly in vaccination, and ought not to have been misrepresented. His protest was justly against the use of impure virus.

During the entire epidemic of mild smallpox, in which 2,746 cases were reported, not a single one of severe eye complications came under my observation, and I have not heard of any cases among my confrères.

During the recent epidemic there have been a number of cases of serious eye complications, and I wish to put on record the present condition of some of these unfortunate patients.

CASE 1.—Mr. O. N., age 30; superintendent. Large adherent corneal opacities of both eyes. Left eye light preception, but no hope of improvement. Right eye good light preception, a small band of clear cornea at outer side. It is possible but not probable that an iridectomy can be made at some future time, giving a little useful vision.

CASE 2.—Mrs. K. S., age 26; housewife. Large perforating ulcer of left eye, including entire cornea, followed by iridocyclitis. Enucleated to relieve pain.

1. Cleveland Medical Journal, February, 1902.

* Read at the Fifty-fourth Annual Session of the American Medical Association, in the Section on Ophthalmology, and approved for publication by the Executive Committee: Drs. J. A. Lippincott, Frank Allport and John E. Weeks.

CASE 3.—B. K., three-year-old girl. Large ulcer involving more than half of cornea of right eye. Staphyloma as large as a bean, with pressure bandage became smooth. Eye quiet, a little clear cornea above, but no useful vision.

CASE 4.—T. K.; laborer; age 33. Total staphyloma of cornea of right eye. Iridocyclitis. Enucleated to relieve pain.

CASE 5.—W. A. H.; mail clerk; age 27. Large ulcer of cornea of right eye including nearly entire cornea, but not perforated. Pupil moderately dilated. Hypopyon. Considerable pain. Ulcer healed very slowly. Counts fingers, but can not hope for much improvement.

CASE 6.—E. P., school girl; age 12. Small ulcer of cornea of right eye. Made little complaint of eye until after discharged from hospital. Several days afterward suddenly developed intense panophthalmitis. Phthisis bulbi.

CASE 7.—G. S., school boy; age 10. Ulcer of cornea of left eye. Panophthalmitis developed before discharged from hospital. Phthisis bulbi.

CASE 8.—J. L., age 27; bricklayer. Left eye ulceration of entire cornea. Immense staphyloma developed so that lids could not be closed and became painful. Enucleated.

Right eye ulceration of almost entire cornea. Anterior chamber full of pus. Saemich operation. Fistula of cornea. Still under observation. Small portion of clear cornea. May be able to make iridectomy and secure a little useful vision, but very doubtful.

CASE 9.—R. F., bookkeeper; age 28. Large ulcer of cornea of right eye. Not perforated. Opacity of cornea at present time, including lower 2/3 of cornea. With pupil dilated, vision 10/200.

CASE 10.—T. R., driver of delivery wagon; aged 19. Ulcer of lower half of cornea of right eye not perforated. Vision six months later 20/200.

CASE 11.—F. M., press hand; age 23. Large perforating corneal ulcer of right eye. Discharged from hospital Nov. 1, 1902. At present writing, March 26, 1903, adherent scar involving at least 3/4 of the cornea, with small fistula just above where the pupil ought to be. Light perception. Still under treatment.

CASE 12.—B. M., four-year-old girl. Discharged from hospital with small corneal ulcer of right eye. Subsequently developed panophthalmitis. Phthisis bulbi.

The following notes were made by Dr. Hartzell. The patients have not been seen since discharged from hospital.

CASE 13.—John S., age 26. Discharged from hospital with panophthalmitis of left eye.

CASE 14.—Mary P., age 6 months. Discharged from hospital with small corneal ulcer of left eye.

CASE 15.—Henry B., age 44. Left hospital with small ulcer of left eye.

CASE 16.—Louis A., aged 2 years. Discharged from hospital with small ulcer of left eye.

CASE 17.—Jennie J., age 28. Discharged from hospital with large ulcer including entire cornea of left eye, and almost entire cornea of right.

CASE 18.—William B., age 18. Discharged from hospital with small ulcer of cornea of left eye.

CASE 19.—Gilbert B., age 30. Discharged from hospital with perforated corneal ulcer and iridocyclitis of left eye.

CASE 20.—Benjamin C., age 55. Discharged from hospital with panophthalmitis of right eye.

CASE 21.—Sadie G., age 30. Discharged from hospital with small ulcer and iridocyclitis of left eye.

CASE 22.—Frank B., age 24. Discharged from hospital with small ulcer of right eye.

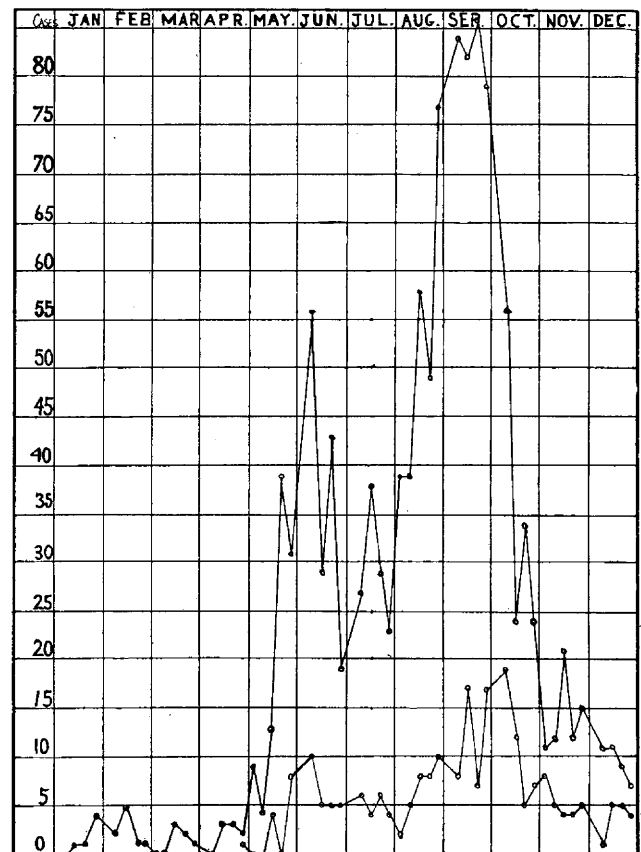
CASE 23.—Walter V., age 18. Discharged from hospital with large ulcer of cornea of right eye and severe ulcer and iridocyclitis of left eye.

No records are available to determine accurately the total number of cases in which the eyes were seriously involved. But I requested Dr. Homer J. Hartzell to make a note of the cases that came under his service at the Detention Hospital. Dr. Hartzell admitted and

treated 425 cases. He had 16 cases of late eye involvements, 13 of one eye and 3 of both, or about 3¾ per cent., which would give us between 45 and 50 cases during the entire epidemic. I think this is approximately correct.

The severity of this infective process may be better appreciated when we recall that of the above 23 cases, 4 are blind in both eyes, with little hope of improvement; 8 have either been enucleated or atrophied from panophthalmitis; 6 are blind in one eye, but the form of the eyeball is preserved. It is probable that several of these will have to be enucleated later. Three have vision of less than 20/200, and not more than 5 have vision better than 20/200, and 2 have corneal fistula, and are still under observation.

In view of this discouraging array of blind and damaged eyes, notwithstanding our supposedly newer and



Smallpox in Cleveland, 1902. Upper curve, cases; lower curve, deaths.

better methods of treatment, we can readily believe the statement of the older writers, that one-third of all the blind people in Europe before Jenner introduced vaccination were due to smallpox.

All these patients had severe confluent variola. In not a single case could be elicited a history of having been successfully vaccinated. In all of the cases attention was called to the corneal lesion relatively late in the disease, about the end of the second, or beginning of the third week, and in a few cases much later. Case 12 was discharged from the hospital with a small ulcer of the cornea, but three weeks later panophthalmitis developed.

A number of these cases were examined bacteriologically and streptococci were always found. Occasionally a mixed infection, with staphylococcus, was present.

Most severe cases of variola have a conjunctivitis and great swelling of the lids early in the disease, and fre-

quently it is impossible to open the eye so as to see the cornea for several days. The fear that destructive corneal lesions may be transpiring unobserved beneath the greatly swollen lids is not often realized; for when the lids can be first opened the cornea will be found clear. The first indication of corneal complications will usually be noticed several days later, after pus and crusts have been forming, and it is quite certain the infection is carried into the eye from the skin on the fingers, handkerchief, dressing, eyedroppers, or directly from crusts on the edges of the lids.

When the house physicians, nurses, attendants and patients at the detention hospital became fully cognizant of the importance of this observation as to the source of the infection, and every possible precaution was taken to disinfect the structures around the eye, there was an appreciable falling off in the number of eye complications.

The patients, however, who suffered most severely were those who barely escaped with their lives, and, doubtless, one reason there are not more blind from smallpox is because so many of the confluent cases die. The vitality of those who survive is so lowered that the cornea sometimes melts away with very little attempt at repair, as I have sometimes seen it do in severe cases of scarlatina, typhoid fever, and other severe and depressing diseases.

In view of my observations during this epidemic, I can not agree with Mackenzie's² statement: "Secondary variolous ophthalmia seldom leads to destruction of the cornea unless the case is altogether neglected." Our cases were not neglected. Resident physicians were in constant attendance, the best of trained nurses were employed, oculists were frequently consulted and patients were given constant and careful attention. One of the resident physicians said: "More time and care was devoted to the eye cases than all the others combined."

Doubtless, there were mild cases of keratitis that escaped our notice, such as described by Dr. Edward Jackson³ in his admirable paper. But they must have been rare. No case of primary infection of the conjunctiva, such as reported by Dr. E. P. Morrow,⁴ came under our observation. I am indebted to Dr. D. B. Smith for the report of the following case: Miss C. K., nurse at the detention hospital, was vaccinated a few days before taking the position, and had a very much inflamed arm, with several characteristic pustules. On the mucous membrane of the right upper eyelid, just at the transitional portion, a perfectly well-defined ulcer appeared. The lid was swollen greatly, and the diagnosis of vaccine pustule was made. Patient made a perfect and uneventful recovery. All of the cases began relatively late in the disease, and were due to a secondary infection, although it is quite possible that there may have been some slight abrasion of the cornea as the result of a primary lesion, thereby permitting the entrance of pathogenic germs later.

Early in the epidemic, while laboring under the belief that the eyes were destroyed as the result of a primary lesion of the conjunctiva or cornea, cases were treated with instillations of 1 per cent. solution of nitrate of silver as a prophylactic, but it seemed with deleterious results. Then protargol formalin and other disinfectants were used, with no better success. Later, subconjunctival injections of bichlorid were used in several cases without benefit. Fewer cases of corneal complica-

tions developed, and our cases progressed better when a routine practice was adopted of frequent washing of the face and lids with 1/4000 bichlorid and flooding the conjunctiva four or five times daily with saturated boric acid solution, and on the first evidence of corneal complications an instillation of 1 per cent. of atropia sulphate two or three times daily. The later treatment of these cases was in no way different than that of corneal ulcers from any other cause.

In conclusion, I wish to observe:

1. In view of the growing sentiment against vaccination almost any community is liable to experience an epidemic as disastrous as that through which Cleveland has just passed.

2. The eye complications of smallpox are greatly to be feared. The dangerous corneal complication is a secondary infection, commencing about the twelfth day, but many come much later.

3. The infection in the Cleveland epidemic was a streptococcus one, and different in no way from similar infection of the eyes of a patient already much exhausted from a serious disease.

4. No specific prophylactic treatment has been found, and the best that can be done is to keep the face and eyes in as nearly an aseptic condition as possible by frequent washing and the use of such antiseptics as will prove the least harmful to the eye.

122 Euclid Avenue.

DISCUSSION.

DR. J. F. FULTON, St. Paul, Minn.—I did not know until a recent epidemic that the eye complications of smallpox were so common. During a recent epidemic we had the same fight in our legislature for the enforcement of vaccination. I had under my care two cases of central ulceration of the cornea. They occurred during the stage of convalescence and resulted in permanent opacities, and it will be necessary to do an iridectomy to secure an improved vision. They were treated on the same line as we treat all ulcers of the cornea. There is a question as to the nature of the ulcer—whether it is the eruption of smallpox or an ulcer due to the run-down condition of the system. It is quite possible that it may be the same eruption as that on the skin.

DR. LEART'S CONNOR, Detroit—It is a question whether the eye complications were due to the general eruption or to streptococcal infection. It would seem in these cases that it was due to the infection, and if so, measures can be taken to prevent it. We have had some mild cases in Detroit, but I have not heard of an eye being lost from this cause. It may be due to the fact that at periodical intervals the whole city has been thoroughly vaccinated. We have lately been made to believe that this was illegal, but formerly it was not considered so, and general vaccination prevented an epidemic. I am convinced that in this, as in allied diseases, we shall fail of best results until we teach the people that vaccination is absolutely necessary. Dr. Baker's observations increase the force of our argument. If we can show that even though the lives of patients are saved, they may be blind, or partially so, we may be able to get the laity to listen to us. The only thing we can do is to promote organization and teach the people such facts as these presented to-day. How much the discovery of the smallpox organism by Dr. Councilman will affect this matter is still undetermined.

DR. B. H. MANN, Texarkana, Ark.—I have treated perhaps five or six cases of corneal ulcer following smallpox, with loss of eye in two cases. Treatment seemed to have no effect whatever.

DR. JOHN A. DONOVAN, Butte, Mont.—As to the question of primary or secondary infection being cause of ulcers, in an extensive epidemic two years ago I saw some cases where primary eruptions occurred on the cornea simultaneously with the skin. These all healed readily when treated with boracic acid wash and yellow oxid ointment. These severe ulcers with

2. Diseases of the Eye, p. 433.

3. Denver Medical Times, December, 1901.

4. Ophthalmic Record, July, 1902.

iritis, etc., I treated were all due to secondary infection. Light cautery punctures in the margin of healthy tissue around the ulcer is the most efficient treatment.

DR. R. W. MILLER, Los Angeles, Cal.—The statistics are indeed instructive, and come to us with a great deal of force. They have the merit of freshness, and may be more helpful to us in bringing the laity to a realization of the dangers of smallpox and the benefits of vaccination than the older statistics. We have to go back but a few years in order to obtain abundant statistics which should convince anybody. In spite of this, however, we find people opposing vaccination. In Los Angeles a few years ago mass meetings were held by anti-vaccinationists opposing vaccination, and these meetings were headed by the editor of one of the daily papers, who refused to have his own child vaccinated so that it might continue to attend the public school.

As suggested by Dr. Connor, we may hope for better things when the profession is more thoroughly organized. The adoption of suitable resolutions and the bringing to bear of concerted influence on the legislatures and health boards will enable us to accomplish more than we have done in the past. There is no question as to the growing sentiment against vaccination in this country, and the only thing perhaps that will convince the public will be a fearful epidemic of smallpox.

I have seen but few of these cases, but I think with Dr. Donovan, that if the ulcer is limited, the cautery is the best means of treatment. As to the applications of medicines, we can often accomplish more by frequent cleansing with the milder agents than by the more irritating agents.

DR. OSCAR DODD, Chicago—I have seen several cases in Chicago at a late stage, after the corneal lesions had healed. Our cases were very mild. I would like to ask Dr. Baker if the corneal complications came on during the stage of eruption or are a later infection.

DR. E. P. MORROW, Canton, Ohio—Dr. Baker mentions a case that occurred in my practice.¹ The eye trouble occurred before the general eruption occurred, and I look on it as the inoculation lesion of smallpox. The patient, about two weeks before, had slept with his cousin, who was supposed to have chicken-pox. The next day in shaving himself he used the same mug his cousin used, and probably got some lather into the eye. Seven days before the general eruption occurred he presented himself with a slight conjunctival hyperemia, limited almost entirely to the lower half of the eyeball. There was a decided white spot, 3 mm. in diameter, on the hyperemic area between the corneal limbus and the caruncle, and in the center of this spot a distinct black dot. I sent him home, assuming the trouble to be insignificant. The next day he presented himself with greatly swollen lids, having the appearance of a case of purulent conjunctivitis; on separating the lids, however, there was no discharge. There was, however, a subconjunctival swelling in the lower half of the bulbar conjunctiva, while the upper half of the cornea and conjunctiva were not involved at all. Until the end of the case there was no discharge. On the seventh day he had a general eruption, which proved to be smallpox. The eye went on to recovery, although there was a slight involvement of the cornea. There was haziness of the lower portion of the cornea, but under irrigations with boracic acid and the use of hot fomentations the eye recovered without any serious damage. I believe this to be a case where the conjunctiva was the initial point of inoculation of smallpox.

DR. D. A. THOMPSON, Indianapolis—During the past year we have had a siege of smallpox, and I saw a number of conjunctival cases, one a severe episcleritis. In the confluent form there were ten cases of ulcer, of which four were lost. It was demonstrated in our cases that vaccination plays an important part in mitigating the trouble.

DR. ALLEN GREENWOOD, Boston—It is reasonable to expect that Dr. Councilman's discovery will bring about a new method of treatment, and that we may possibly be able to control this condition as we do the diphtheritic conjunctivitis by an antitoxin.

1. Ophthalmic Record, July, 1902.

DR. F. W. HILSCHER, Spokane, Wash.—I would like to report a case similar to that of Dr. Morrow's, in which there was conjunctivitis near the limbus before the eruption of the disease appeared. I treated the patient about a week before the eruption broke out. It had the appearance of a phlyctenular conjunctivitis. At the end of about a week he seemed depressed and had a little fever and general malaise, and I suspected smallpox, and called in a health officer and turned the patient over to him. It illustrates also the value of isolation. The patient was from just outside the city limits. We had an efficient city official, but a rather negligent county physician; the city remained comparatively free from the disease, and the cases in the city could be traced in nearly every instance to infection from the county outside the city limits.

DR. JOHN E. WEEKS, New York—The discussion has brought out that the affection may sometimes be primary in the eye. I had thought that perhaps in all the cases the infection was a secondary one, and due to the entrance of substances from the lids or brow after abrasion of the corneal epithelium. I have not had experience in the treatment of smallpox, but it seems to me that the use of oily preparations to prevent the scattering of the exfoliations would be of service in preventing secondary infection of the eye; oily preparations, with perhaps an antiseptic added. In regard to the complications that may follow, I have seen cataract as a result of corneal ulcer following smallpox.

DR. ALBERT R. BAKER, Cleveland, Ohio—I believe in all cases the eruption appears on the mucous membrane just as on the skin, and probably in all there was a primary eruption of the mucous membrane of the eye. The eye is so greatly swollen in confluent cases that it is difficult to tell. It is impossible to open the eye to examine it for several days. But for all practical purposes these cases of bad infection are secondary, and the infection is conveyed to the eye by means of the fingers, or in some similar way. We used vaselin, as suggested by the Chairman, in all these cases. As to the primary infection as in Dr. Morrow's case, the only one that in any way resembled that was the case of Dr. Smith, in which there was a vaccine infection carried from the arm to the eye.

The general condition of these eye patients was pitiable indeed. Even with good nursing in many of them you could pick up the crusts from the bed in handfull weeks and months after the case was discharged from the hospital as cured.

As to the chart, you will observe that it keeps running up gradually until we were having 85 to 88 new cases reported a week, with 15 to 20 deaths. Our health officer was still disinfecting. We were threatened by quarantine by all lake cities, and then our business men became alarmed and called in the State Board of Health, who insisted on general vaccination, appointed 250 public vaccinators and vaccinated over two hundred thousand people within a week, and the epidemic was almost immediately ended, as shown by the chart.

CRAMP OF THE CILIARY MUSCLE DUE TO EYESTRAIN.*

JOHN W. WRIGHT, M.D.

Professor of Ophthalmology in the Ohio Medical University;
Ophthalmologist to the Protestant Hospital.
COLUMBUS, OHIO.

As every physician should have a knowledge of what is known as professional cramp, a painful spasm of the finger, hand, forearm or arm from excessive use, as is often found in writers, telegraphers, pianists, violinists, typewriters, etc., so should every oculist have a knowledge that certain eye muscles, especially the ciliary, are liable to the same condition when subject to enforced contraction for prolonged periods of time.

No oculist who does much fitting for glasses has failed to notice that, although the greatest care has been ob-

* Read at the Fifty-fourth Annual Session of the American Medical Association, in the Section on Ophthalmology, and approved for publication by the Executive Committee: Drs. J. A. Lippincott, Frank Allport and John E. Weeks.