

THE POSSIBILITY OF SUPPRESSING DIPHTHERIA.*

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THE use of the immunizing properties of diphtheria antitoxin at the present time, in the belief of the writer, should be advocated by sanitary bodies, but not in any other sense forced on the public. Its value as a therapeutic agent becomes more and more widely appreciated, and when physicians begin to feel that no real danger attends its use they will be more and more eager to protect the remaining children of the family.

It is very difficult to say how much immunization is done in private practice. The physicians generally draw an ample amount of the serum for the case in hand, and if they find the parents in the humour, inject the other children without informing us. All that can be said is that it is certain that the practice is increasing. The reports received from private practitioners by us form so small a part of the entire number that the writer prefers to rely on the results obtained in institutions where an outbreak of diphtheria has begun.

It is doubtless known to everyone present that the immunizing effect of an injection of diphtheria antitoxin is very transitory, and in this respect differs radically from vaccination. According to our experience, it can be counted on for a period of three weeks, but in a considerable number of cases will outlast six. It follows from this statement that the agent can only be used for children especially endangered, and that it should be repeated when necessary until the special danger of contagion is over. It is especially applicable to the remaining children in an infected family or institution, and to others who may be known to have played with the patient. At the present time, when the physician will have to urge the practice, and so take on himself a considerable responsibility, he may avail himself of the bacteriological test, with the intention of injecting those who have the diphtheria bacilli in their throats. It is not to be understood that this course is recommended except as a compromise, because it is probable that exposed children sometimes have so few diphtheria bacilli in their throats that they may not be found by the bacteriologist. The physician should

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urge the injection when the case, which is the source of exposure, is severe.

The severity of an epidemic disease may be considered to be due to two main factors, of which one is the virulence of the contagion, shown by a great percentage of severe cases, the other is the resisting power of the individual patient. Those who have the opportunity of witnessing outbreaks in remote villages where the disease has been introduced by a single case—and the virus has consequently the same pedigree in all cases—will see these two elements of severity at work. In such a village a type of diphtheria may appear which destroys nearly every patient without much regard to age or laryngeal involvement. In other epidemics death is rare except among young children with croup. These differences in the character of epidemics are plainly due to the varying degrees of virulence of the contagion, while the few severe cases in the mild epidemics, especially the severe non-laryngeal cases, and the few mild cases in the severe epidemics, are plainly due to an individual peculiarity of the patients.

In large cities and the adjacent regions the epidemic is composed of several interlacing epidemics, due to viruses of different pedigrees.

In these highly malignant epidemics, which are fortunately rare, immunization is of extreme importance for the very reason that the result of treatment after the disease has begun is not generally brilliant.

It is wise to give a large dose, say 1,000 units, or even 2,000, because, as exposure has already occurred, and the incubation period of diphtheria is very short, the antitoxin given for immunization is at times simply early treatment. In estimating its success allowance for this fact must be made, especially if the disease should be manifest in some concealed position such as the larynx.

In Pittsburgh, where the serum costs nothing, it is common to use 2,000 units. Very seldom less than 1,000 units is used. Where the expense is deterrent, not less than 500 units should be used, though as low as 200 have been recommended.

In private practice the injection is seldom or never repeated. Apparently success has been very complete, but the writer is unwilling to make dogmatic statements based upon partial system especially with no means of knowing how far a favourable result may have been a motive for making the report. The degree of exposure is also often imperfectly stated. A considerable number of the brothers and sisters of cases have been examined bacterio-

logically, but it is a striking fact that diphtheria bacilli have been found in only a small number.

Beginning with 1896 we have had a great deal of experience in dealing with outbreaks in two institutions in Pittsburgh inhabited principally by young children and their attendants. The Roselia Foundling and Fraternity Hospital generally has a population of from eighty to ninety, of whom about three-fourths are children. The children are very young, and consequently exceedingly susceptible to diphtheria contagion. This institution has been immunized on four different occasions. The first time there were two cases at the beginning—one fatal (in a syphilitic child); at another time there were three, with one fatal; on the other occasions there was a single original case, which recovered. On all these occasions the inmates were immunized and no further cases developed, except the first time, when the resident physician developed diphtheria forty days after the immunizing injection. Since this time it has been the practice to repeat the immunization at intervals shorter than three weeks, at least in persons who turn out to have diphtheria bacilli, and to continue the injections until all the inmates are free from diphtheria bacilli, which is likely not to be the case until more than six weeks after the disease appears. This practice has always been followed with success. The cases are separated, as soon as suspected, from all others, and as far as practicable those which show the contagion by the bacteriological test are also kept separate, though want of room sometimes has made this separation imperfect. The management of the institution at present rely largely on immunization. A case is not considered free from contagion until two successive negative reports are obtained.

In the most recent outbreak sixteen persons were found to have diphtheria bacilli in their throats—all but one in the ward where the original case arose. On the other hand a minority of the children in this ward remained negative. From many of these children who were exposed and infected without developing the disease the diphtheria bacilli disappeared very early, but in a few they persisted for a long period.

The result of our examinations indicate that about 5 per cent. of the convalescents carry the contagion more than thirty days after convalescence, and that a smaller number may exceed twice this period. Much the same things can be said of the immunized cases. The necessity for repeating the injection arises from the fact that in some cases the contagion will outlast the period of immunity following a single injection. Where there are several

infected children, the one in whose throat the contagion lasts longest may infect the others. Repeated injections are consequently especially necessary in an institution.

The Pittsburgh hospital for children has an average population of about twenty-five, ranging from one to twelve in age. More than half the children are well enough to play together. A single case has appeared in this institution on several occasions and immunization has been resorted to on each occasion. There have been no deaths in this institution. The practice of repeating injections has not been carried out. It has happened twice that one of the immunized has taken diphtheria a month after the injection, otherwise the results have been perfect.

The proper way to deal with diphtheria in such institutions, in the opinion of the writer, after isolating the original cases and leaving those obviously exposed by themselves, is to immunize all the children. Bacteriological examinations should be made twice, separating the negatives. The twice negative can be considered free from danger, and not to require further injections, provided isolation is sure. Those who are positive should be examined until two successive negatives are obtained, after which they should be released. As soon as the twentieth day after the original injection is reached another should be given to all positives. The same thing should be done at the end of the second period of twenty days, and so on until the last child has become free.

It is obvious that a physician could adopt the same course in private practice. The health authorities could also follow out this course in entire analogy with the practice of vaccinating in the vicinity of small-pox. The writer does not believe, however, that the time has yet come to make such a practice compulsory.

Without pretending that such a scheme is practical at the present time, the writer conceives that the following programme would effect the same control over diphtheria that we now have over small-pox:

Bacteriological examination of all cases of sore throat, croup and the like, which might be by any possibility due to the contagion of diphtheria. Complete isolation of all positives until the contagion is ascertained to have disappeared. A hospital of sufficient capacity to accommodate convalescents for the necessary length of time may be regarded as an indispensable adjunct of the quarantine system.

Inspection of the schools by competent persons, with examination of all sore throats, will not only meet one of the dangers of carrying the disease out of one neighbourhood into a healthy one, but will

also serve to check the physicians who neglect their duty, and to capture cases which are not attended by a physician at all. To this may be added thorough disinfection by steam and formaldehyde gas.

The fundamental necessity of the system is the recognition of diphtheria contagion independently of the clinical symptoms—especially the constitutional symptoms—and this would awaken greater opposition in the case of diphtheria than in any other disease. If we were to enforce quarantine at the present time, without regard to clinical symptoms, the practical result would be that the physicians, without whose aid we can do nothing, would send us no cultures for examination except in cases which they believed should be quarantined. For this reason I believe that the bacteriologist should be confirmed by the clinician for the present.

In the meantime, the quarantining of medium and severe cases, if sufficiently rigid, may have the effect of suppressing the most virulent breeds of infection, with the result of a more favourable mortality. It is claimed that diphtheria was formerly more severe than at present. The old records are so imperfect that it would be difficult to be sure of the truth of this assertion. If it is true, it may be due to the effect of isolation in restraining more especially the severe types of contagion.

THE Sanitary Inspectors' Examination Board have included the Bradford Municipal Technical College, the University College, Sheffield, and the Heriot Watt College, Edinburgh, among the institutions whose syllabus of instruction is approved by the Board, and the certificates of instruction issued by those institutions are recognised by the Board as qualifying candidates for examination for the purpose of the Public Health (London) Act, 1891.

PREVENTION OF DIPHTHERIA.—W. E. Hart, M.D., Health Officer for Elysia, reported to the Cleveland Medical Society (December 28th, 1900) a fatal case of laryngeal diphtheria in a boy who had been ill for five days before medical assistance was summoned. Antitoxin was used, and there was also administered 500 units each to the father, mother, and three older children, two smaller children getting 250 units each. All those members of the family remained well, and suffered no inconvenience whatever on account of the antitoxin. A few days after the house had been disinfected, an older brother, sixteen years of age, returned home after several weeks' absence. In about three days he complained of having a sore throat, but thought it only a mild cold. Getting no better, however, his father decided to take him to the office of his physician. There is no doubt that this boy had had diphtheria at least three days before antitoxin was administered. The larynx was considerably involved, yet by using antitoxin promptly and freely the symptoms quickly subsided.