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ORIGINAL ARTICLES.

ON THE TREATMENT OF DIPHTHERIA.

BY J. W. BROWN, M.D., OF CENTRAL NEW YORK.

Read in the Section on Diseases of Children of American Medical Association, May, 1884.

Omitting the historical review of the nature and origin of this malady, together with its pathological, histological and disputed theories of formation, and practically ignoring symptoms, diagnosis and prognosis as beyond the scope of the present paper and time at my disposal, and assuming that we are all familiar with this affection and that our results have been disappointing when faced by an epidemic, by the unfavorable mortality averaging, as Oertel claims, 40 to 50 per cent. the question naturally is suggested, Can we lower this fearful percentage? I present, gentlemen, a few facts gained from a study and experience of over one hundred and twenty (120) recorded cases occurring in my individual practice during a period of about fourteen (14) months. Its plan is not new, being advocated by Tropean, and endorsed by Dr. Whittaker, of Ohio, at the meeting of this Association in Richmond. It promises, I think, more satisfactory results than common, and while recognizing the local nature, it does not advocate the radical caustic treatment of recent date and prominent endorsement. During a practice of about ten years the usual sporadic cases were observed and with indifferent treatment the most of them recovered. The present epidemic began in August, 1880, and continued with varying severity for about the time stated. The causes are obscure, as we are situated in Central New York. The surface of the country is rolling and well drained; the area of territory invaded may be estimated as about one-half ($\frac{1}{2}$) mile by four (4) miles, averaging a descent of one hundred feet to the mile. Geological formation is limestone and we have no stagnant water. During a residence of nearly nine years no other epidemics were observed. General sanitary condition the average of country villages. Population about one thousand; manufacturing (mills) and farming the principal occupations. Water supply mainly obtained from wells and springs; no sewerage, but the usual country "back house." The general type was severe, and no case has been recorded where distinct exudation was not present.

The catarrhal and croupous forms were readily recognized, many of the latter proving malignant. The catarrhal form was readily merged into the croupous, and fauces were generally well covered in twenty-four hours.

The invasion was generally sudden—chilliness being first complained of, which, with the pain in back and soreness of throat, soon told the story. I regard it as *contagious*, having personally acquired it twice in less than six months from close attention to bad cases. The temperature I could not rely upon, severe and even fatal cases having no extreme elevation from normal.

The complications were numerous, and convalescence in many instances protracted. My mortality was light, considering the severity of the epidemic. The following are numbers of fatal cases as they occurred, with analysis of causes of death: Nos. 1, 6, 17, 19, 36, 66, 68—total, 7. In case I. nasal hæmorrhage and asthenia can be assigned as the cause, and was unavoidable and almost assured, as she was not seen until about forty-eight hours before, and with neglect and lack of treatment fell an easy victim. In case VI. death was due to erosion of arteries in posterior nares, together with general debility. This case had been progressing finely, but owing to my acquiring it, as I think, from him, and being confined to my bed, I did not see him. Death ensued in about forty-eight hours, although his throat had been perfectly cleared at my last visit. In case XVII. death was undoubtedly due to the extreme severity. An overwhelming attack, with complete systemic infection. Membrane formed so rapidly and blocked throat so completely, that scissors had to be used to keep passages open and prevent suffocation. Case XIX. was convalescent. Membrane had been entirely cleared, with no re-formation for forty-eight hours. Death very suddenly from paralysis of the heart. Case XXXVI. was malignant, and died from complete systemic infection and prostration. Sloughing of tonsils and nasal hæmorrhage. Case LXVI., death was peculiar, and history not satisfactory, but I should judge from asthenia. I saw him forty-eight hours previous, and throat was practically clean. Had been severely affected, but was convalescent; appetite good, and I considered him out of danger. Was prostrated with my second seizure, and I learned that a fatal result terminated the battle two days subsequently. Case LXVIII., death in fifty-two hours. Malignant, tonsils sloughed, nasal hæmorrhage. Whole number of fatal cases, seven (7); from disease alone, three (3); from complications, four (4). There

were but three cases in which treatment was without apparent effect, and who succumbed to the disease proper, and yet these measures were successful in relieving the fauces of the remainder, who perished from the complications.

The ages varied from an infant of 4 months to a lady of 60, but was mainly among those under 16 years. I regard it as a constitutional disease, with local affection of the throat as its most characteristic symptom, and consider the chief dangers due to systemic infection, with subsequent poisoning and prostration, and that to the *immediate* mitigation of throat symptoms by *topical* measures, together with urgent stimulation and constant support, must our chief reliance be made. I do not *dare* to sit down and let the throat take care of itself. No *half way* measures succeed. We *must be* thorough, and we must not palliate, or the "golden stair" will be ascended before we are aware, and our fancied security be an illusion. Two attacks with alarming severity is my excuse, so I may be allowed my objections to this delusion that we should cherish, "DON'T DO IT." And now, gentlemen, what shall we do? At my first visit I give 5 grains of calomel every four hours until bowels are thoroughly evacuated. This starts up secretions and eliminates much effete material, and in itself is of great utility. I have salt pork cut thin and rubbed full of table salt and bound over tonsils from ear to ear, fastening at the vertex (stitching through and through the muslin will prevent troublesome slipping). I touch the throat in ordinary cases once daily (although much depends upon activity of membranous formation), and in severe cases twice or more, though not too often, as increased irritation following too frequent applications in my own case was a painful illustration, and rendered me more careful afterward. Absorbent cotton held in a sponge-holder proves a happy medium for making applications, which consist of the following:

- R** Ferri pr. sulph.....3i.
Glycerine and
Pure cider vinegar aa.....3ss. M.
S. Apply.

This when gently applied (not swabbed) and held for a few seconds in apposition to affected parts has the effect of penetrating the deposit, which shrivels and falls off, and also hardens the engorged tissues beneath. This in many cases does not occur at once, but may require repeated applications. Do not be tempted to make them too often, and above all, use no force in detaching that which is apparently loose, as I can personally condemn its bad effects. Septic absorption is less active from the coagulation and hardening of subjacent structures. Upon no account is force or swabbing to be resorted to, and unless suffocation is imminent or fear of swallowing membrane present, I would not forcibly detach it, as it forms all the more rapidly upon the torn and raw surface beneath, and systemic infection is all the more profound. Gently place cotton in apposition, and gentle pressure will be all that is required. I atomize throat freely, frequently and thoroughly, depending upon the severity of the case, with:

- R** Ferri pr. sulph.....grx.
Pure cider vinegar.....
Pure water aa.....3ss. M.
S. With atomizer.

In nasal diphtheria, if inhaled at time of atomization, benefit will be more pronounced. Any atomizer will be found convenient that throws a liberal spray, and in epidemics it is indispensable that each patient should procure his own, which must be scalded frequently. Atomizer must be well applied to affected parts and spray thrown well up in posterior nares for a few minutes, when practicable. Always *know* that it is thoroughly done or you will be disappointed in your results. Young children may require force, but the atomization must be made at short intervals, and have nurses fully understand the imperative necessity of complying. Among the worst cases of laryngeal variety I ever saw was a child of seven years, whose recovery is due to persistent and thorough atomization given by his father. Epiglottitis was loaded for two days, but we persevered and eventually won the battle. Gargles of brandy and water, chlorate of potassa, salt, pepper and vinegar are useful but must in no way interfere with thorough and regular atomization. As exudate re-forms more rapidly during night, greater caution and care are required. As constitutional remedies I give after bowels are freely evacuated:

- R** Tr. ferri chlorid.....3ss
Saturated solution potass. chlorate...
Syrupi simplex aa.....3xvj M.
S. 5i every hour.

Three grains each of potassa chlorate and quinia sulphas every five or six hours is generally beneficial. All should be cautioned against swallowing the membrane, as it produces symptoms resembling arsenical poisoning. When taken in quantities, potassa chlorate in solution in teaspoonful doses occasionally is of value as a neutralizing agent. Know that the nursing is of the best and not *too* frequent changes; *know* that your directions are obeyed as to the minutiae or often your efforts are in vain. See personally that *enough* nourishment is taken, *nolens volens*. Milk is to be preferred as being more readily assimilated; beef tea, extract, etc., etc., may be used. I advocate stimulants from the first, even in mild cases. There seems to be an enervation of heart even from the first; a diminished "vis-a-tergo," and heroic stimulation may win the day as I personally know, even when convalescent; and I think my results were better and I had less alarming cases of enfeebled heart after my adoption of more thorough stimulation. Good bourbon or rye whiskey or brandy can be used, as may be preferred. The quantity must be regulated by the judgment of attendant and effect produced, the pulse being our guide. I gave over a pint of whiskey in less than eight hours to a boy of seven years, and no ill effects were perceptible as he recovered, thanks to the stimulation. Kidneys must act properly, also bowels at least once every second day.

Isolation *must be enforced*. Fumigate daily with sulphur upon live coals. Disinfect all discharges with cupri sulphas. Take plenty of fresh air, keep

out draughts. In my family of seven none contracted disease, although two were under three years of age. Same results generally when orders were fully obeyed.

A history of my own attacks may be of interest and for once I know all about it. The first was extremely severe. Membrane very thick and re-forming very actively. Throat made worse by too frequent applications. Prostration extreme, malignant tendency for twelve hours, greatly diminished heart's action and enfeeblement. Tendency for heart clot on fifth day. Convalescence rapid. Loss of twenty pounds. The second attack was due to exposure to Case 68 where I was compelled to plug nostrils. Throat affected in twelve hours. Blood oozed from fauces for twenty-four hours before exudate appeared, which was of the greenish malignant kind. Right tonsil partially sloughed. Recovery protracted, and I did not feel perfectly well for over a year afterwards. Topical measures and *energetic* stimulation were strictly enforced.

After convalescence is established, good food, tonics and fresh air are required.

Tracheotomy was performed once, but I would not advise it again. I have abandoned all treatment for the following, and base my deductions upon results obtained with no selection of cases. Let our gospel be one of thoroughness, stimulation, topical applications, tonics and nourishment. Look upon the localized deposit and relieve it, and your battle is more than half won. Do not be deluded by this lime water treatment, and abandon the use of nitrate of silver. Avoid harshness, but use whiskey.

DISCUSSION.

Dr. S. W. Smith, of New York, wished to know how the essayist made his diagnosis, as other diseases closely resemble diphtheria, such as follicular pharyngitis, and can only be recognized by washing off the membrane.

In the dispensary where he was assistant there were 175 cases seen monthly, or about 1,800 cases yearly. Met during the two years 25 cases of diphtheria. Catarrhal tonsillitis and follicular pharyngitis in many cases resemble diphtheria, but in those diseases the membrane can be removed without hæmorrhage. The disease can find a point of departure from other parts of the body besides the tonsils. Recalls a case where the first manifestation was on the genitals and passed into the vagina. The child died.

The statistics of the State of Vermont give a mortality of 50 per cent. Dr. Billington's (chief of the Dispensary service) treatment consisted in washing out mouth and nose with a solution of salt water and giving internally chlorate of potassium, tincture of the chloride of iron and glycerine.

Quinine and alcohol were not given because there did not appear to him to be any indication for their use. Lost a case where it was impossible to wash out throat. Believes the disease to be constitutional and local in character.

Dr. A. Behrend, Washington, D. C., called attention to the fact that the cases here were uniformly fatal when hoarseness commenced.

Dr. Franklin, Ohio.—Why does Dr. Smith object to quinine?

Dr. Smith.—Because fever went down when the throat was well washed out. Milk was given freely during the attack.

Dr. Franklin.—Out West it is necessary to give quinine on account of malaria. Has found iron and quinine of great benefit. Also employs a gargle of salt and vinegar as was first recommended by Trouseau. This brings the membrane up in large blocks. Has had few deaths since he adopted this line of treatment. In rheumatic throat trouble guaiacum has been found good. Rheumatism complicates this very often.

Dr. J. Lewis Smith, N. Y., does not agree with those who hold that the disease is a local one. Local treatment does not cure. Must be constitutional because the kidneys are so early affected. It is either constitutional at first or becomes so very quickly. What must we use if it is a constitutional disease? Micrococci are found everywhere, kidneys, etc. Have we any remedy for this disease? Alcohol appears to meet the indication and can be used in large quantities without intoxication. This is much better than iron and quinine. Has been led to look with distrust on the antiseptics. No agent can act on the micrococci without hurting the system. They would destroy the normal cells as quickly as the morbid matter. The sulphite of soda, phenic acid, etc., do not accomplish as much as alcohol. Jacobi and others look with favor on Pepper's treatment with the bichloride of mercury in small doses. In syphilis this improves the blood corpuscles. In this we may have an important agent. Tenesmus may result. This is a good agent according to New York physicians. Looks with distrust on statistics. The disease varies the same as the scarlatina type changes. Recalls the case of a physician who had not had one death among fifty cases of the disease and immediately afterwards lost his own child with it. The local treatment is important because it destroys the micrococci and prevents septic poisoning. Septic absorption occurs where the membrane invades the cells of the mucous coat. Uses in nasal diphtheria:

℞ Sodium chlorid.....3i.
Acidi Boracici.....3ss.
Aquæ.....Oj.

Or,

℞ Hydrarg. Bichlor.....gr. ii.
Aquæ.....Oj.

What is to be done in diphtheritic croup? Tracheotomy? No. Dreads to be called to these cases. No irritating substances, such as bromine, should be employed on such surface, as they only extend the inflammation. Has found the alkalis good in breaking up the fibrinous membrane. Alkalis dissolve both fibrine and mucin. Great benefit is found in watching for the hoarseness and commencing treatment at once, and mothers are instructed to be on their guard about this. Use steam atomizer with liq. potassium, 3iii; strong aqua calcis, Oj.

Dr. Burrows, Ill., agrees with Dr. Smith, but employs sulphur for insufflation, as there is danger of the

nasal injections producing otitis media. It also has some effect on the blood corpuscles.

Dr. Harris, of Va.—Results claimed for treatment are much better than Virginia gives. In the epidemic two years ago three-fourths died. They were in a state of collapse from the beginning, and never rallied. The regular treatment was adopted. This is the dark side. Then, on the other side, all cases recover without treatment. These were typical cases. In only a small proportion of the cases is the larynx affected. Spasmodic croup can be mistaken for true croup and diphtheria. Has seen two cases cured by Pepper's treatment.

Dr. Miller, Allegheny, Pa.—The thirtieth of a grain of bichloride of mercury given every hour softens the membrane when the remedy acts. Pay attention to the well. Examine every day. In his own family pilocarpine had a good effect. Also the permanganate of potassium acts well locally.

In the County Orphans' Asylum has not used a pint of alcohol during some years, but gives milk in large quantities.

Dr. S. C. Busey, D. C.—There are three forms of the disease. The first can only be recognized by the resulting paralysis. The second can be recognized and treated. The third all die.

Mistakes are made frequently; the simple can be converted into the severer form. There are more deaths from the disease in country towns and more deaths where the simple (catarrhal) throat troubles prevail. It is both local and constitutional, for data from the census reports show that it is not always constitutional. In Virginia the cases were dead from the beginning. Certain number of local cases can become constitutional. Local treatment is very important. Dissolve membrane off first, and then apply oleate of mercury. Solution of nitric acid, 1-3, or spray 1-5, best to remove membrane. No case lost where this was done. Support with milk and beef tea. The former best. Internally give chlorate of potassium, tincture chloride of iron, and alcohol.

Dr. Ulrich, Pa.—Did the doctor make a distinction between diphtheritic and membranous croup?

Dr. S. W. Smith.—The latter is distinct from diphtheria, but during an epidemic, diphtheria can have diphtheritic croup engraved on it.

Dr. Ulrich.—We can have both diphtheritic and membranous croup. The treatment is different. Has not changed treatment in diphtheria since an epidemic seen in Louisiana a number of years ago; 13 cases died at the outset of the epidemic. Had good results with large doses of chlorate of potass. and tincture of chloride of iron. Does not neglect local treatment, but does not rely on it. It is difficult to use anything. Muriatic acid and honey is a good application. Physicians do not use enough of iron in these cases. Large doses of calomel have been given; acts same as the bichloride of mercury.

Dr. Free.—Is not chlorate of potassium injurious in large doses? Has seen several deaths from it, due to kidney complication. It is considered good treatment in his county to save 80 per cent. Uses stimulants at once in large doses. Tincture of the chloride of iron is used, but omits quinine. No reason for it

except that it disturbs the stomach and has slight antiseptic effect. No deaths from diphtheritic laryngitis in his county. Milk and beef tea (home made and Johnson's) employed. Always uses constitutional and local treatment. Meets with paralysis in all cases. In answer to question said that he used half to two ounces of rye whiskey every two hours.

Dr. Hicks, of Virginia, said cases of diphtheritic laryngitis were all fatal. About two cases usually occurred in an epidemic. Treatment depends on theory. Diphtheria cannot arise from catarrhal diseases, but the latter can predispose to it. Like only begets like. Why do physicians prescribe chloride of potassium and the tincture of chloride of iron? As antiseptics? Sepsis does not occur until late in the disease. Chlorate of potassium is very bad for the kidneys. The disease can be divided into three types.

1st. Mild cases. All get well. We do not know how the disease does when left to itself. Formerly, pneumonia (an inflammatory disease), when actively treated, gave a mortality of 30 per cent. Now, when left to itself, there is only a mortality of 5 per cent.

In the second class certain ones can be cured with food and tonics. Germicides are to be used.

In the third class all die. Severe treatment does no good.

Mild solution of chloral good. Quinine also good for fever. The disease cannot be studied in country practice, because there active treatment must be resorted to or else the patients employ some other physician.

Dr. Holton is a firm believer in the contagiousness of the disease. Gave several examples to illustrate this. How is the poison of the disease carried? It can be conveyed after recovery, and without the person conveying it having had it. Formerly thought it to be a constitutional, but now believes it to be a local disease. Germs accumulate and fructify on the mucous surfaces. Believes in local treatment. This depends on form. In 113 cases there were 13 deaths. Two deaths in cases not treated. Nine of the other eleven were treated by Homœopaths. Where there was no treatment death resulted.

Uses chlorine as recommended by Watson, but stronger. Believes in whiskey but not in quinine. The latter acts upon the blood corpuscles, and these are not affected in diphtheria. Can be of service later on in the disease by its effects on the lymphatic system. Stimulants are necessary.

Dr. Hicks, of Vermont, believes that it is contagious, and gave examples. Circumstances modify its contagiousness.

Dr. Park, Dauphin Co., Pa.—There are many cases of diphtheria where no communication has taken place. Death is rare, except from diphtheritic laryngitis. A gargle of tannic acid, carbolic acid and glycerine is in general use. Does not believe in contagiousness.

Dr. Wm. Lee, Md.—Success depends on the diagnosis. Nothing is so difficult as to diagnose diphtheria from catarrhal angina. Never call a case diphtheria, unless both tonsils are affected or patch extends behind uvula, or pharyngeal folds. Both

tonsils are very soon affected. In diphtheritic coryza the secretion microscopically shows all the elements of diphtheria. Employs resorcin locally and constitutionally, instead of alcohol. Does not believe in mopping the throat. Has seen children die in the arms while being mopped. Treats all cases as contagious.

Dr. Ulrich, Pa.—The pharyngitis can be the first stage of diphtheria. We cannot make a distinction at first. It cannot culminate in diphtheria. The latter is constitutional, the former not.

Dr. Busey.—Cannot diphtheria be engrafted on pharyngitis?

Dr. Ulrich.—Yes. The latter can be the starting point. The system is contaminated with the diphtheritic poison.

Dr. S. W. Smith.—The distinctive sign is that the deposit in pharyngitis can be washed away, which cannot be done in diphtheria. Does not believe the disease to be contagious. There is no danger of ear trouble in washing out nose.

Dr. Brown.—The paper was to show the good effects of the sub-sulphate of iron in diphtheria. Regards hoarseness as a valuable sign of diphtheritic laryngitis. Has found vinegar a good solvent of the membrane. Temperature curves are valueless. It is a constitutional disease, and tracheotomy has been fatal in all cases where it was performed. But the patients had an easier death. Has had no experience with the bichloride of mercury.

ON ASSURING HEALTHY DENTINE OVER ENDANGERED PULPS.

BY JACOB L. WILLIAMS, M.D., BOSTON, MASS.

Read in the Section on Oral and Dental Surgery of American Medical Association, May, 1884.

In saying endangered pulps I mean cases where the pulps have but little of the natural covering of dentine in the depths of cavities, which covering is very apt to be more or less tainted by disease, that is by the agents that have produced caries.

Let us look at the conditions here existing. There is acid with fermentive action, often in full sway, seeming at first sight to demand the most decided and effective neutralizing and corrective applications. But, just beyond lie some of the most highly and delicately organized tissues of the whole body; fibres, that if rudely set vibrating will be likely to continue or repeat their vibrations in a very serious way; tissue, which if inflamed, there is none more doubtful of survival; and we must remember that the life of the pulp means additional years of usefulness to its organ.

These circumstances I fear are often too little considered in the use of violent or caustic applications.

But what should be done? Perhaps my ideas on this point may be best given by mentioning a plan of treatment for such cases that I formed, tested,

and adopted during the years 1847 and 1848; and which in its general principles I have found to be most satisfactory up to the present time. Of course, since that date new materials have been added to our list of available correctives for diseased conditions.

After first removing the loosest débris, I applied a mild antacid such as aqua calcis or a solution of bicarbonate of soda, after thorough saturation with which, I treated the cavity for the correction of fermentive elements by the application of a solution of chloride of calcium, also very dilute creosote (we now have several substitutes for that). The cavity was then dried and sealed up for from two to three weeks, when it was opened and the *mild* saturation repeated, adding perhaps a mild astringent, such as tannic acid in weak solution, to the latter application. Then it was sealed up again, generally for a longer period, and the dressing was repeated at proper intervals until permanent health of dentine was assured.

Now with these mild correctives we have a greater chance of avoiding undue irritation of the pulp than with stronger applications; but they will be more or less transient in their effect, and therefore will require frequent repetition, which may be less frequent as the dentine gains in soundness and health.

By this method we help nature in the line of her preference, that is to protect rather than injure a vital point, keeping the disease in check to give her opportunity.

It may be, and has sometimes been said, that this treatment is very troublesome, and, why not make one strong application, and trust that nature will do the rest? I reply that the great objection is that while a strong or caustic dressing is not always lasting in corrective influence, it adds vastly to the possibilities, if it does not make sure, that the reparative action of the pulp will be interfered with, resulting in failure of the ultimate object of secondary deposit. Instances of this sort are often seen in practice; and in my observation the proportion of success of the mild repetition plan is far beyond that of the single capping practice.

Of course there will be some chance of non-success in many attempts to save the pulp, depending often on constitutional as well as local causes, and both may be obscure. The best and most promising efforts may be thwarted by neglect of the patient to report at proper times, or by interruption of the general health. Or, again, when cases are nearly ready for a permanent operation, they may be piratically appropriated by some person who very probably will speak lightly of the treatment that has brought the teeth into condition for his profitable seizure. But still our highest duty is to save life rather than to destroy or endanger it.

Representative cases might be related from a large number with various phases, but to describe them minutely would task both your time and patience.

Plaster of Paris was first used as a cap for the exposed portion. Oxide of tin was also mixed with the gutta-percha.

One rather extreme case I might mention, occurring in 1854.