University of Glasgow

Thesis for Degree of MD

By

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Subject Diphtheria

Diphtheria, so called, has now become divided into "Membranous" or "True", & "Pseudo-Membranous" or "False". The former depends on the presence of the Klebs Loefflen Bacillus; in the latter it is absent. It will be my endeavour to shew how the two may be both present in the same epidemic. I shall also discuss the question as to whether it is not possible for the one to have a protecting influence from the other, & shall give an account of a few interesting cases.

During the winter of 1892-93, when a wave of Diphtheria swept over all the rural districts of England, it was my lot to attend a

very severe epidemic, which took place in the village of Eglingham & surrounding district: The district seems to unite all the conditions favourable to the spread of the disease as mentioned by D^r R. Thorne Thorne. It lies along the "Exposed north eastern coast"; "The water is upheld in gravel" & to the "Resulting dampness is superadded a cold bleak air, & vegetable decomposition".

I was first summoned on the evening of October 27th, at the very time of year when the disease is most apt to be prevalent, to a gamekeeper's family, consisting of parents, & seven children, whose ages ranged from seventeen years to two. I found two boys complaining of sore throat. One was fifteen years

old, & the other eight. On the latter's throat there was a white firm looking patch of exudation confined to one tonsil. The elder lad's throat was only red & sore looking, but his temperature was 104° F. One of the girls too had been ailing for some days, was passing very little urine, which contained both blood & albumen, & was very feverish. She also had an unhealthy looking sore, covered with a scab, on the anterior nares. I was afraid of Scarlet Fever but isolation was that night quite impossible. The next day revealed the true state of affairs. The elder boy's temperature was still very high & his throat, both tonsils & soft palate, was covered with a slough, which, I felt assured

was diphtheritic. The girl too was complaining of soreness in the vagina, which on examination revealed a similar state of affairs. The younger lad was in much the same condition as the previous night, his throat a little sore, but no constitutional disturbance. I at once ordered the other children out of the house, & took rigorous measures to try & prevent the spread of the disease. I sprayed the throats, & flushed the vagina, with Perchloride of Mercury solution; I prescribed Liquor Ferri Perchloridi internally; & I steamed the room continually with a mixture of Eucalyptus, Carbolic Acid, & Turpentine. As I was then interesting myself in Bacteriology I got pieces of the sloughs from the throats & vagina

I examined them very carefully
The slough from the throat of the
elder lad, & from the vagina,
gave, according to Sanarkoff's method,
from a streake inoculation on
sterilized white of egg, growth
within twenty four hours. Examined
microscopically, after staining, according
to Loeffler, with methylene blue
they showed the bacillus to be present
in large quantities, the club ends
being very well marked. Micrococci
were also present. The slough obtained
from the younger lad did not
give growth in 24 hours. The bacillus
was absent, but micrococci were
present, staphylococci as well as
streptococci. Here at the very outset
I made an observation which was
to be of great service to me, & which
gave me an additional interest in my

The elder lad had a very bad attack & I despaired almost of his recovery. His temperature rarely fell below 104°F. The tonsils, soft palate & uvula, became affected with very deep slaughing ulcers, & vomiting was very constant for some days. He ultimately however became convalescent. The peculiar part about the girl's case was that the throat did not become affected for some time. The scab on the anterior nares was diphtheritic, the presence of the bacillus being assured & she became similarly affected on different parts of the body. Large scabs formed without any apparent abrasion. They were more scabs than slaughs being almost like Rupia in their formation, but on their removal

ulcers were left. I nearly always demonstrated the presence of the bacillus in these scabs & on treating them with boracic poultice, & washing the remaining ulcer with perchloride they quickly healed. The vagina however was very bad, & the albumen & blood in the urine continued for some time.

With the younger lad there was never any difficulty. The patch on the tonsil confined itself to the one place, & soon disappeared with little constitutional disturbance. He quickly became convalescent and acted as nurse to his elder brother, sleeping with him, & being with him continually. Yet he never took true diphtheria. What prevented him? Can the false disease confer immunity from the true. My experience

would lead me to believe so. This little chap escaped although he was in weak health, was living under unsanitary conditions, as I shall presently show, & was constantly exposed to the infection. His throat too must have been in a susceptible condition. Thorne says that the lesion of the fauces in Scarlatina affords a favourable soil for the reception of the diphtheria contagium. If the lesion of Scarlatina does so why not any other lesion. Some will say that he had the true disease. Other authorities again hold that the fact of the exudation confining itself to the one tonsil proves the case not to have been Diphtheria. In any case where was the bacillus under my microscopic examinations were at fault. And granting my examinations

were at fault the question still remains Can these benign throats, which are described by numerous writers as distinct from the true disease, become malignant
Just recently Klebs has asserted that a substance which he calls "Antidiphtherin" is a certain cure for Diphtheria. It is obtained from weakened cultures of the bacillus on fluid media & possesses the power in the highest degree of killing the bacillus. Is it possible that the false attack is similar to the weakened culture & is able to confer immunity. E Klein too describes a bacillus bearing some resemblance to the Loeffler. It is only occasionally met with in the diphtheritic membrane, & it does not act pathogenically on animals. It would appear as if this might be some degenerate form

of the organism. It can be differentiated from it by chemical tests & does not possess its virulence. Can we not carry this a step further, & produce a still weaker microbe with the power of devouring the pabulum on which the Klebs Loeffler bacillus feeds & in some other way conferring immunity from the latter, & may not the false disease be caused by some such germ. I had the same experience in other cases, one child down with the true disease another child down in the same house with a white patch on the tonsil, no constitutional disturbance & much recovery, & in no instance did the latter condition develop into the former. Rickards says "the mere fact of no disease in man which protects him from a different disease" but

in the same address he admits that we have learnt that "Disease may be modified by cultivation". I would contend that we have not here two diseases but one disease modified by cultivation

Thorne again says that preceding any marked diphtheria cases it often happens, that for some considerable period, there has been prevailing a large amount of illness to which are applied such terms as "Sore throat" "Tonsilitis" etc these attacks commonly receiving but little notice until the "Seasonal activity" of diphtheria showed their true meaning. He indicates how the mild throat attacks are often the connecting links between successive prevalences of well marked diphtheria. The infectious quality of the minor throat affections is

also advanted to, & he points out how in the same household fatal diphtheria is contracted from them. But surely the Klebs Loefflen bacillus breeds true, & if true diphtheria results the bacillus must have been present in the mild cases. We know certainly that this organism retains its vitality for long periods. D'Espine & E de Marignal state that cultures kept sixteen months have retained their primary virulence & Serestre cites cases showing that the vitality of the bacillus may remain latent, not only for months but years, & subsequently become active under favourable circumstances. The same seems to think that the only thing wanting for the mild to develop into the severe, is the "Seasonal activity" He speaks of us having to do with

"An unstable poison which gives evidence of a progressive development of the property of infectiveness" that is that under certain conditions what is commonly called sore throat may acquire a specific quality ultimately resulting in true diphtheria. If such is the case the bacillus must have been present all through. The true disease can arise from no other source. And yet its presence has never been demonstrated in these cases, & I have always failed to find it.. I contend that it is absent in its usual form, though it may be present in a degraded, & unrecognizable condition, & further that when the true disease does make its appearance, it never attacks those who have suffered from a false attack, but seeks

fresh soil. Thane speaks of "Chronic Diphtheria", & it is asserted that one attack of Diphtheria does not confer immunity from a second. It may not always do so, any more than one attack of Scarlet Fever prevents a second, but in the majority of cases it does so. My clinical experience seems to demonstrate two distinct types of the disease, & in my opinion the so called "Sore throat" or "Pseudo-membranous" type is a weakened form, caused by a weakened bacillus, which renders the patient immune from the true type, which may be raging at the same time or subsequent to it. I do not mean to say that every person having had a sore throat is rendered immune from Diphtheria, & I fully recognize that there are slight as well as severe attacks

of this disease, but I do contend that having had the pseudo membranous form he is at any rate "Less liable" to take the severe form, & I hold that more attention should be paid to the bacteriological examination of the false disease. I regret that I did not myself learn this lesson sooner as I was only on the look out for the Loeffler bacillus & examined most carefully for it. If we can bring ourselves to believe in the degradation of the bacillus, can we not also imagine the opposite taking place, that is the possibility of a degraded bacillus, under favourable circumstances, acquiring increased power. This would account for Thorne's "Unstable poison" & "Progressive development of the power of infectiveness" which

is otherwise unaccountable. We try hard to produce a weakened stomach, but do not strive after a weakened microbe. The former we know can kill the latter, but, becoming absorbed itself, eventually does the damage. We do not seem to realize that a weakened organism might of itself produce a weakened stomach which would do no damage, but would reap the harvest ready for its stronger brother, & so keep him at a distance. This is I know an original idea but at any rate it merits some attention

Following on the gamekeeper's family other cases quickly made their appearance in the village & neighbourhood I had great difficulty in getting the Schools closed, but, when this was effected the epidemic began to die out. The whole place was in a very

unsanitary condition the schools more particularly so, & to this cause I must assign the beginning of the trouble. There were a few cases which seemed to have no connection with the Schools; & regarding them I noticed a somewhat curious fact. The village consists of a road with houses on each side. This road is the boundary between two different landlords. On one side the property belongs to the Earl of Tankerville, on the other to the old Northumbrian family of the Ogles. The latter changed hands a year before the epidemic broke out, & the new landlord spent a lot of money in repairing his property particularly in spartin the houses. Lord Tankerville's property on the other hand is in a very bad condition. It is far removed from his Lordship's seat at Chillingham

& still further from the residence of his factor. Consequently it is badly attended to, & has been allowed to lapse into a very unsanitary state. Sir William Jenner has contended since his lectures were first published in 1861 that Diphtheria is independent of bad hygiene conditions, & this view is supported by Samuel Wilks, Thorne & others. Some discussion has recently taken place on this subject but my experience compels me to hold, what, from our knowledge of other diseases seems the more probable view, that this disease is often the result of unsanitary conditions. Thorne himself admits that ~~scarlet~~ bad hygiene produces sore throat & sore throat leaves an abraded surface which affords a very suitable soil for inoculation by the Diphtheria organism. All my fatal cases

were on the bad side of the village
as were also all these which had no connection
with the schools & which seemed to
have arisen "De novo". One of these
latter was a somewhat curious one.
During the height of the epidemic I
was called to attend a woman in
labour. I took all the precautions
that I could & the woman was
delivered of a healthy child without
any difficulty. There was no Diphtheria
in the house & at my orders they had
no communication with their neighbours
I myself kept away but papers was
reported to me each morning. On the
sixth day I was informed that the
umbilical cord had come off & that
all was well. A good account was
also given the next day. The eighth
day however brought word that the
child was fretful, & the navel red

I at once advised that it should be well washed with perchloride. The next morning early, the ninth from the birth, I was summoned to the child to find it dying. The progress had been terribly rapid, & the whole of the anterior wall of the abdomen was a huge slough. The child died but the mother made an uninterrupted recovery. On examination of the slough the Klebs Loeffler bacillus was found but there was no lesion in the larynx. The question at once presented itself to my mind. How in this case has the disease been caused. Only three people had seen the baby its mother, its grandmother who acted as nurse, & myself. The length of time that had elapsed since I had seen it excluded me from the responsibility. It could scarcely have

been the mother, & as to the grandmother she had not, since the birth, been outside the house. The father was the only person who had entered it. He is an agricultural labourer & is out in the open air all day which ought to cleanse him from all infection. The only explanation I can give is that the disease arose de novo from the accompanying unsanitary conditions. ~~Another unfortunate case~~

Another unfortunate case was that of a lad aged fourteen the son of a shepherd. He lived on the moor in a house two miles distant from any other habitation, & with only a foot road leading to it. This lad was in Eglingham on the Friday afternoon. He called at the post office for some letters but as

there were none he returned home without having entered any place of abode. He took Diphtheria on the Sunday, & died on the Wednesday He came into contact with no one, & I am totally at a loss to explain the origin of his attack. The house he lived in was certainly a hovel but I cannot help thinking that his visit to Eglingham was in some way or other accountable for his death. It would almost appear as if the air of the village had been loaded with infection unless we suppose, that weakened by his walk he became a prey to the bacillus which was present in the insanitary surroundings of his home The disease after once making its appearance spread to other members of the family

Though I had several cases of Paralysis following the Diphtheria only one was troublesome. It was that of an adult aged thirty five Whilst his eldest child was down with the disease he took what must have been an attack of Croup, but occurring in one of his years the symptoms were somewhat obscured. He was very distressed in appearance with out any apparent cause. Breathing was laboured, & there was a slight cough, not frequent, but croupy in character Grasping the windpipe between finger & thumb caused great pain There was no expectoration so I had no chance of demonstrating the presence of the bacillus. After some time he recovered & it was not till he had been at work six

marks that the loss of power occurred. It was very obstinate but disappeared almost as suddenly as it had appeared. It is only fair to state that this happened almost immediately after the exhibition of Mycelune alpha. As this was the only case in which this treatment was tried I cannot speak with any authority though all other remedies seemed of no avail

To summarise my conclusions I would contend

(i) That the so called "True & False" diseases are one & the same disease

(ii) That an attack of one confers immunity from the other

(iii) That the Klebs Loeffler bacillus is capable of

undergoing a process of degradation & reconstruction & according to its strength so is the disease modified Probably therefore careful bacteriological examination might reveal its presence in some weakened form in the mild attacks

(14) That Sanitation plays an important part both in the etiology & treatment of the disease