Thesis
on
The Antiseptic treatment of Scarlet Fever
by
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Before referring to the treatment of scarlet fever, I should like to draw attention to certain views with reference to this disease which, if not novel, have, at any rate, little stress laid on them in most works on the subject.

Scarlet fever is the result of the entry of a specific poison into the system and in my opinion this poison usually enters by a definite point of inoculation, namely, the throat. I am inclined to believe this for the following reasons:
1) I have never failed to detect some inflammation of the throat and swelling of the neighbouring lymphatic glands at the commencement of the febrile attack even before the appearance of the rash; and where one member of a family has been affected with the disease, I have found sore-throat and swelling of the glands in some of the others a day or two
before the onset of the febrile symptoms.
I have noticed too that the throat
affection often begins insidiously
and causes little discomfort at
first so that it is often far advanced
before complained of by the
patient.
Squire (Owen's Dict. of Medicine
1886 Vol II p. 1388) says:
"The longest clear interval from a
single definite exposure has been
42 days. In most of the instances
where 4 to 5 days have intervened
2 or 3 of these days have not
been without sore-throat or
other sign of invasion"
and again p. 1389:
"Infection is generally received
by the throat & lungs, & seldom
by a wound or abrasion of the
skin & never by the unwounded
skin; at first it multiplies at
the point of reception, hence pro-
ably the day or two of
sore-throat; and is delayed but
little in the lymphatics before entering the blood"
and again p. 1390
"sore-throat is always present,
during the day or two before
the seizure and almost from the
time of receiving the infection,
some traces of this are observable."
(2) The frequency with which
sore-throat occurs in persons
who have had scarlet fever, also
exposed to infection, seems to me
to point to the throat as the
usual point of inoculation;
but in this case owing to the
protection afforded by the first
attack, the throat is unable to
infect the system.
Dr. J. Lewis Smith (Pepper System of
Practical Medicine 1885 Vol. I. p. 505)
regards these affections of the throat
as "local in their nature, instead
of being local manifestations of
the constitutional disease."
Bristowe (Medecine 1864 p. 162)
regards these sore-throats as abortive attacks of scarlet fever.
Squire (Queen's Diet. of Medicine Vol. II. p 1388) says:
"Every case of sore-throat occurring in an infected house is capable of conveying scarlet fever, whether the subject of it be protected or not."

I recently attended a man of 38 for a sore-throat and a day or two after the children of the house were attacked by scarlet fever - probably an example of infection being conveyed in this way.

This sore-throat would correspond to the chancreoid produced by inoculation of a syphilitic with secretion from an inflamed treachere mentioned by Hutchinson in the Lettsomeian lectures of 1886.

In exceptional cases, doubtless, the poison enters by some other route.

Thus Squire (vol. p. 1389) says:
"Infection is most rapid when carried direct to the lungs, as when inhaled through a tracheotomy tube, or particles being detainted on the pharynx." Perhaps the poison enters the lungs direct in those supposed cases which prove so rapidly fatal, and it probably often enters by a different route in those attacked after surgical operations or in puerperal women. But for the reasons above stated, I think the throat is the usual point of inoculation.

After inoculation, the poison multiplies in the throat which acts as a reservoir of it to the system. Aeration of the throat often occurs and the extent of the aeration is usually a measure of the severity of the attack. The aereated throat of scarlet fever...
seems more liable than other ulcerated throats to give rise to septicaemia. I have little doubt that these cases where extensive ulceration is followed by such symptoms as depression, restlessness or delirium, weak and rapid pulse, dry tongue perhaps covered with sordes, cold peripherations are really attacks of septicaemia on the top of the specific disorder.

Perhaps abraded surfaces to which the sepulchral poison has access have an unusual liability to septice poisoning.

Playfair (Midwifery) 1884 Vol I pp.342-31 produces evidence that the contagion of scarlet fever may produce in puerperal women either scarlet fever or septiceamic, & also mentions Sir J. Paget's & S. Spencer Wells as favouring the idea that septic pyaemia may be produced by
the scarlet fever poison.
In the recent transactions of the obstetrical Roe of London re-
ported in the Lancet of 26 March 1878 British Medical Journal 14th April
opinion was decided on this subject.
If these views as to the nature of the throat affection in scarlet fever be correct, the
throat becomes the most important item in all treatment, both preventive
and curative.

As regards the other symptoms or sequelae of scarlet fever, I only wish here to refer to the
changes that are found in the kidneys.

As to the etiology of the kidney lesion, the common opinion seems to be that it is due to the
direct influence of the scarlet
fever poison on the renal cells.

Dr. George Johnson (Decrees of
Kidney, 1852, p. 109) says:

"All the changes of structure com-
mence in the secreting cells of
the gland and are the result of an
effort made by the cells to
eliminate from the blood some
abnormal products, some
materials which do not natural-
ly enter into the composition
of the renal secretions."

It seems probable that the
kidneys always undergo more
or less morbid change and
this change, as is well shown
by Dr. Woodhead (Practical
Pathology, 1883, p. 196), begins
and precedes the interlobular
arteries & Malpighian bodies
and may be so marked as to
cause convulsions & death follow-
ing suppression of urine in
the first week, or there may
be suppression for a day.
and re-establishment of the secretion with the appearance in it of blood, albumen & hyaline casts; but most commonly the only sign of the kidney affection in the first week is temporary albuminuria with perhaps a little blood. This may pass off & the patient recover with no further sign of kidney mischief or as happens in a certain percentage of cases the albumen returns accompanied by diminution pyreue, anasarca & the other signs of purp-ecrulateral nephritis. This happens during desquamation, when the nerves of the skin are unusually exposed & the patient is thus peculiarly liable to catch a chill, the kidneys being more or less likely to suffer according to the amount of the primary peri-glomerular
Thus if the primary change has been well marked a bilious exudation, such as constipation or a slight exposure during desquamation, might cause a retum of the symptoms of nephritis.

In Diphtheria we get a primary effect on the kidneys, perhaps causing the appearance of blood, albumen, rhabdomyolysis or granular casts in the urine. But, there being no desquamation during convalescence, these conditions of the urine are rarely of long duration and scarcely ever usher indropsy, uraemia or permanent lesion of the kidneys.

Thus in the causation of post-aneurithal nephritis we have two factors to consider viz: (i) the greater or less amount
Of periglomerular lesion produced in the first week or rather during the febrile attack by the direct effect of the poison and in the state of the skin during desquamation.

If we can by any means lessen the amount of the primary kidney lesion we at the same time exercise great caution in protecting the surface of the body from chills during desquamation, we greatly lessen the chance of the superimposition of post-scarlatinal nephritis.

There being no further points to which I wish to refer, as to the nature of scarlet fever, I will now turn to the treatment.
Treatment

The treatment of scarlet fever by internal antiseptics has not found much favour with the profession from the improbability of being able to give large enough quantities of the drugs without producing toxic symptoms. Thus Brumton (Pharmacology 1885 p. 85) says: "The use of antiseptics internally is limited by the resistance of the organism itself" I append some favourable notices of this treatment.

J Lewis Smith (Pepper's System of Medicine 1885 Vol I p. 337) says: "From observations made by myself in nearly twenty families in which scarlet fever was prevailing, I am convinced that Boracic acid deserves trial as a preventive and antidote of scarlet fever as well as diphtheria." He also mentions (36) a syrup
of Phenol (Carbolic) acid prepared by DeNey as being employed by several of the New York physicians, but "without sufficient statistics as yet to determine its efficacy."

In the Lancet of Jan. 22nd, 1867, Dr. Keith of Normanby mentions 600 cases of 2cemic disease, principally scarlet fever and measles, treated by Carbolic acid with only 5 deaths.

In the Lancet of Oct. 8th, 1867, Dr. J. Wigglesworth of Liverpool writes that he has treated 300 cases of scarlet fever by Carbolic acid with no deaths and only 9 cases of albuminuria and one of glandular suppuration. He begins with a dose of 3 minims of Carbolic Acid liquified by the addition of 10 p.c. of water for children from 2 to 6 years old and gives it every 2 hours night and day for the first 3
days, longer if necessary, but if the patient be doing well, every 3 hours until the 4th or 5th day, then every 4 hours until all danger is past and finally 3 times a day until perfectly convalescent. In older patients his dose is 4 minims & in adults even 5 or 6. He does not interfere with the ulcerated tonsils, which he finds invariably affected, but looks upon the extent of the ulceration as an indication of the severity of the attack & regulates the dose of the acid accordingly. He regards the smoky or black tinct of the urine as a test that the dose is sufficient & says that he has never known any harm ensue from these doses of Carboolic acid, but recommends that, if possible, the patient should be seen at least twice a day to either
increase or lessen the dose. He also writes that he has used it as a prophylactic with the happiest results in doses of 1 minims three times a day, intercourse with the pack not being prohibited. I have had the opportunity of trying the carbolic acid treatment in an epidemic that occurred in Birkenhead last winter (1887-8) and obtained very good results. I have ascertained that during the last 6 months of 1887 659 cases of scarlet fever were reported in the borough and that 67 deaths occurred during the same period from that disease; and that during the first 3 months of 1888 148 cases were reported with 20 deaths. These figures give a mortality of 10.6 per cent for the whole
epidemic.
In the dispensary department of the Borough Hospital I have
had during these 9 months 200 cases of scarlet fever
under my treatment.
I tried the Carbolic Acid treat-
ment in every case that came
under my treatment during
two periods. The first period
included October & part of
November 1887 & the second
January, February & March
1888.
The number of cases treated
in these two periods was 74
as the type of the disease
maintained its severity
throughout the epidemic, as
evidenced by the mortality.
I think I may fairly contrast
the results so obtained with
those obtained by other methods
of treatment.
The remaining 131 cases were
treated in the usual way, internally with such drugs as Liquor Ammoniaci Acetatis, Chlorate of Potash &c, & with such throat applications as Glycerine of Rosae Acid.

Out of these 131 cases there were 15 deaths & 20 cases of post-renalalinal nephrites, 4 of the 15 deaths being due to this latter cause.

Out of the 44 cases treated by Carbolic Acid there were 2 deaths & 5 cases of post-renalalinal nephritis.

The one fatal case was the result of nephritis causing death in the 7th week & was I have little doubt brought about by neglect of the precautions enjoined during convalescence.

The other was a child of 8 years old, which after taking the Carbolic Acid for a day or two, was seized with
diarrhoea accompanied by great pain. I thought this was due to the drug, I discontinued its use; a day or two afterwards suppuration took place in the glands of the neck, followed by extensive sloughing which finally gave rise to fatal haemorrhage from the deep vessels of the neck. Thus this case could not be paid to have really undergone the treatment & as it was the only one in which diarrhoea & purpura occurred during the administration of the drug it may have been one of those exceptional cases of scarlet fever in which diarrhoea is a prominent symptom. This was likewise the only case of glandular suppuration out of the 14. There was also almost an entire absence of auricular nasal complications.
The comparison of these figures shows not only a decrease of mortality but also a decrease in the frequency of the occurrence of post-scarlatinal nephritis under the Carbolic acid treatment.

By converting these figures to percentages we find that the 44 cases treated by Carbolic Acid gave a mortality of 2.7 per cent as compared with a mortality of 11.7 per cent for the remaining cases treated by me and 11.1 per cent for all the remaining cases treated in the borough.

Also that the percentage of my cases affected by post-scarlatinal nephritis after the Carbolic Acid treatment was 6.7 as compared with 15.2 after other methods of treatment.

The large total of 25 cases of
post-scarlatinal nephritis was doubtless due to the wretched housing and nursing of many of the patients and the impossibility of having proper precautions observed during desquamation.

As to the **Method of Administration**, I usually prescribe 2 grains of the Carbolic Acid with Glycerine and Extract of Orange in an ounce of water every 2 hours night and day. I have very seldom found it necessary to increase this dose, most of my patients having been children from 2 to 6 or 7 years old. The frequency of the dose may be gradually diminished as improvement takes place but is not to be discontinued till the ulceration of the throat is quite healed. There is very rarely any old trouble in getting
children to take it.

For adults or those old enough to gargle, I prescribe a gargle of 5 grains of the ounce of carbolic acid in water with a little glycerin added so that it beused at least every 2 hours night and day at first, its frequency to be gradually diminished as improvement takes place. Along with this gargle I often give a mixture containing small doses of belladonna and strychnine.

Among the most noticeable effects of the drug when given internally, I have observed a rapid lowering of the pulse and an unusual tendency to sleep. The pupils were often considerably dilated. The color of the urine varied from smoky to prussian blue, often becoming black after standing. The average
Temperature was decidedly lower than among the cases treated by other methods, the throat symptoms less pronounced; nasal or aural complications absent or slight in fact, the disease itself seemed to run a milder course.

Of the use of the drug as a prophylactic, I have not as yet made an extensive enough trial to determine its value.

Mode of Action
The nature of the scarlet fever poison is as yet undiscovered, though several microbes have been described in connection with it, such as the Monos haematinicum of Klebs etc. But since the work of Ekland, consequently it is impossible to speak absolutely as to what effect
on its propagation in the blood, Carbolic Acid taken externally might have.
Lauder Brunton (Pharmacology 1885 p 44) says:
"A dilution of Carbolic Acid 1 in 1250 and 1 in 850 sufficed to prevent the growth of anthrax bacilli; while a strength of 1 in 500 was required to prevent the growth of others. In a child of 65 lbs. weight with 5 lbs. of blood 28 grains of Carbolic Acid well be required to produce a 1 in 1250 solution in the blood, so that the virus would have to have a resisting power about 74 of that of the anthrax bacilli. In order to have its growth prevented by 2 grain doses of Carbolic Acid, seeing that the drug is so rapidly eliminated in the urine, that no accumulation is possible.
I am rather inclined to think that the beneficial effect of the drug is, at any rate, chiefly due to its local action. 

Firstly as a prophylactic—If it be conceded that the throat is the usual point of inoculation, it is easy to understand how swallowing an antiseptic fluid several times a day would lessen the chance of circulatation taking place. The drug of course having no effect in the exceptional cases where the system is infected by some other route.

Gargling with a solution of carbolic acid ought to have an equally good, if not better, effect.

Secondly as a remedial agent. The carbolic acid being taken every 2 hours keeps the
mouth constantly washed out with an antiseptic solution and this checks the propagation of the poison in the throat, lessens the amount of it admitted into the system and by so doing induces a milder type of its disease. By limiting the extent of the throat mischief, it tends to ward off the troublesome nasal complications which are the result of direct extension from the throat. It also promotes the healing of the ulcers and prevents septic absorption by their surfaces at a later stage. If less of the poison be admitted into the system the amount of the primary pericapsular lesion of the kidneys will be lessened what being so the kidneys will more quickly recover and thus there will be less
liability to the supervision of post-scarlatinal nephritis during desquamation.

The reasons why this method of treatment is superior to other methods where antiseptic applications to the throat are made use of, are, I think, the following:

1. The application of the antiseptic is begun early, kept up constantly, frequently, while in other methods of treatment the applications are not made use of, until the throat mischief has become more or less pronounced & seems to demand some treatment & are, I think, probably not frequent enough.

Thus Bristowe (Medicine 1884, p. 170) says: "To relieve the swolennes of the throat use of the inhalation of steam or warm milk slowly
swallowed or astringent or antiseptic gargles are employed. Squire (Quain's Dictionary of Medicine 1886. Vol. II. p. 1393) says: "The throat symptoms often claim early attention." He then goes on to recommend see to suck 

potatoes externally but lays no stress on antiseptic applications, though he suggests taking chlorate of Potash into the mouth or using a spray fit. (2) The difficulty of making efficient applications to the throat in young children; any form of swabbing would probably cause a good deal of irritation even if they could be got to submit to it often enough or if the attendants could be persuaded to do it often enough; and sprays are usually set aside for dispensary patients.
Consequently for young children, if intubation is advisable as being more practicable and having no injurious internal action when carefully watched but perhaps a beneficial one. The cases I have treated by the gargling alone have done very well that have not been many, most of my patients as I said before having been young children.

In conclusion, I do not doubt that only antiseptics used in the same way will prove equally efficacious, the essential part of the treatment apparently being that the use of the antiseptic, whether as a gargle or spray or internally, should be begun early and repeated frequently.