



Scarlet Fever

Being
a Thesis for the degree of M.D.
in the University of Glasgow.

by

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Introduction.

I purpose in the following pages to record a few particulars about Scarlet Fever from observations made principally on 120 cases, which were admitted into Dumbarton Combination Fever Hospital in the years 1892 and 1893, during which time I was Medical Officer there.

I shall not confine myself wholly to these cases, but shall take up cases seen in private practice during the same period.

I have taken up the following points about Scarlet Fever, and in the order named;—

1. Historical Sketch.
2. The Rash
3. The Relationship between the height of the temperature and the duration of the fever.
4. Family Relationship.
5. The Relationship between Scarlet Fever and Diphtheria.
6. Period of Desquamation.
7. Treatment.

1. Historical Sketch.

In the writings of Ingrassias and Sennert, the symptoms and signs of Scarlet Fever are clearly given; Sennert also mentions the articular affections which sometimes arise, but neither of these writers made the disease distinct from other diseases.

To Sydenham is due the credit of differentiating Scarlet Fever from all other diseases, which he did during the London Epidemic of 1661 - 1645. The disease, however, was only recognised as distinct, separate, and specific after Hiberden, Hillan, and Hothergill wrote on the subject.

For a satisfactory record of this disease, however, we cannot go very far back.

From the statistics of the Poor Law returns; the reports of Fever Hospitals, and of some towns where notification of infectious diseases had been early adopted, we obtain means for considering the relation of Scarlet Fever to age, sex, and season; and to other diseases. Among the papers which have

been written on the subject may be mentioned those by Dr. Matthews Duncan in the "Edinburgh Medical Journal" for 1846.; by the Registrar-General in the "Annual Summary" for 1880. and the Annual Report for 1886.; and by Dr. Barnes in the "British Medical Journal" Vol II. 1884.

We find also from the very first, Scarlet Fever showed marked differences in type. Sydenham, in his writings from personal experience, had never seen severe Scarlet Fever, and had a contempt for the disease, which he was far from having for either Measles or Small-pox. At the beginning of this century Boettner reported that from 1799 to 1822 he had never seen a fatal case, and regarded it at that time as a very mild disease. A few years later, however, he saw a severe epidemic, which carried off many of his own patients, and he came to regard the disease as equally mortal with plague, Typhus and Cholera. Graves, of Dublin, reported that from 1800

to 1804 Scarlet Fever ravaged Ireland, and was very fatal, whilst from 1804 to 1831 the same physicians who had found it so virulent before, now scarcely saw a fatal case, so mild had the disease become.

It is also evident from the source mentioned above, that Scarlet Fever has a virulent outbreak of from one to four years duration every 25 or 30 years, followed in the intervening years by mild cases and epidemics of the same disease.

2. The Rash.

In connection with the Rash, there is one peculiarity to which I wish to draw attention, and which I have not seen re-marked on anywhere.

This is a subcuticular redness, which appears on the first day of the illness, and therefore before the true rash. It can usually only be seen in a subdued light, disappearing when the part is brought into a bright light. I shall give two cases to illustrate this rash.

Case I. I saw a boy, A Campbell aged 4 yrs on the first day of his illness, when there was sore-throat, a temperature of $103^{\circ} F.$, pulse 120. There was no rash, but there was this peculiar redness, which was quite distinct as he lay in bed in a subdued light. It looked very like the uniform red blush of Scarlet Fever when seen in this way, but on bringing the parts into a strong light the redness disappeared. There was no eruption to be made out at this time, but next

day the punctiform scarlet rash was quite distinct.

Case II. Mrs Kane, aged 35, I also saw before the true rash had appeared. I first saw her in the early morning and this subcuticular redness was quite marked as she lay in bed in a dim light; it disappeared when she came into the bright light. I called again that evening, when the true rash was just appearing on her arms, whilst the rest of her body still showed the same as in the morning.

Having now noticed this early rash in six cases altogether, (that is to say I have detected it in every case of Scarlet Fever which I have seen on the first day of the illness), I have come to regard it as of some value in the early diagnosis of the disease.

I think that this subcuticular rash appears at the same time as the raising of the temperature in Scarlet Fever, or within a few hours thereafter, and remains until it is lost in the true rash on the second day.

There seems, indeed, to be a determination of blood to the skin, from the very commencement of the illness which causes this redness; and apparently it has to gather force, or become more exaggerated, before it can appear on the surface of the skin.

It may be said that all fevers produce determination of blood to the surface of the body, in the sense that the circulation is increased in rapidity and therefore more blood will travel through the skin capillaries in a given time; but so far as I have noticed, this increased circulation does not produce the subcuticular redness in other fevers, and I therefore look upon it as being an early manifestation of scarlet fever, just as the true rash is a somewhat later manifestation.

3 The Relationship between the height of the Temperature and the duration of the Fever

There were 51 cases admitted to Hospital on the first or second day of the rash, and counting from the beginning of the rash, I found that the height of the temperature had very little to do with the duration of the fever, taking the temperature at any time during the illness.

I include all kinds of Scarlet Fever which ran the usual course without complications.

The usual time for the temperature to become normal was between the sixth and ninth days from the beginning of the rash.

In five cases which were admitted with the temperature under 100° F. however, the temperature was normal on the second day in four, and on the third day in the other one; but, otherwise, I found that those with a temperature of 101° F. kept as long fevered as those with a

temperature of $104^{\circ} F.$ or $105^{\circ} F.$; or, in other words, those with a commencing temperature of $104^{\circ} F.$ became as soon normal as those with a commencing temperature of $101^{\circ} F.$

Age and sex had no influence on the height of the temperature nor on the duration of the fever.

4. Family Relationship

My observations of the character of the disease in several members of the same family, supports the opinion that hereditary influence has a good deal to do with the severity, mildness, or otherwise, of scarlet fever, - that is to say that Scarlet Fever shows the same characteristics in the different members of one family

Let me illustrate this by two examples; -
Two sisters, Bella and Marjory Robertson aged 11 and 13 years respectively, were admitted to the hospital on the second day of their illnesses with very severe Scarlatina Anginosa; both were sick and vomiting, with occasional delirium and had temperatures of $103.6^{\circ} F$ and 104.7 . Both were in a critical condition for 3 or 4 days, but, ultimately, made good recoveries, and were discharged cured, on the same day.

Their brother John, aged $14\frac{1}{2}$ years was admitted three days after their

admission, with Scarlet Fever and malignant sore-throat. He had persistent vomiting, was often delirious and died 36 hrs after admission.

There was also one child, aged 3 years, who died at home about the same time from Scarlatina Anginosa.

The other example is that of four children named M^{rs} Swan, from near the same place, aged 7, 10, 13 & 14½ years. They were all admitted about the same time as the Robertsons (example above). They usually played together, and had evidently got the disease from the same source. None of the M^{rs} Swans had a temperature above 101.6° F, all were very mild cases and showed a marked similarity to one another.

Having observed many cases of family resemblance in Scarlet Fever similar to the above examples, it seems probable that, whilst no doubt epidemics or epidemic poisons vary very much as to their virulency, that virulency must always tell more severely

on some families than others.

This, I believe, is the view generally held, and I only add my testimony from personal experience.

5. The Relationship between Scarlet Fever and Diphtheria

Since I wrote my own observations on this subject, it has come up for discussion in the Clinical Society of London, reported in the "British Medical Journal" of January 20th 1894. The members there expressed the opinion that diphtheria with Scarlet Fever was very rare; but a membranous inflammation of the throat during convalescence from Scarlet Fever was generally true Diphtheria.

These opinions, expressed by eminent men, coincides with what I had observed in my humble sphere at Dumbarton, and I had written about the following case before seeing the above notice in the "British Medical Journal"; -

Andrew Marshall, aged 4 years, I saw first on the night of the 20th of July 1892; - the first day of the rash. He was removed to hospital two days later, when there was a profuse rash all over the body, and extremities, - the tonsils were considerably swollen, with

a slight exudation on their surfaces, the temperature was $102.6^{\circ}F$, the pulse 130, no albuminuria. From this date, the fever steadily decreased, and on the morning of the 24th of July, - 5 days after admission to hospital, the temperature was normal, the rash had greatly disappeared, and the tonsils were only slightly enlarged, and without spots. All went well until the 2nd August, which was 13 dys from the appearance of the rash, and all appearances of the fever had disappeared, desquamation not having yet commenced. On that day he got out of bed during the short absence of the nurse, and sat at the window for probably about 10 minutes. He became restless during that night and next morning his temperature was $100.6^{\circ}F$., and from this it steadily rose until it reached $104.2^{\circ}F$ next evening. The tonsils were again much swollen, and covered with a 'dirty yellowish-white membrane, thickly coated tongue, foul smelling discharge from the nose, very offensive breath, uncountable pulse, occasional delirium and slight albuminuria. The child lay in this condition

for six days, when the temperature dropped to 101.4 F. It gradually sank to the normal on 15th August and kept down. With the fall of the temperature, all the other symptoms became less urgent, and by the time the temperature was normal, all the other signs of fever had disappeared; and the only thing left to indicate that there had been fever, except the debility, was the desquamation, which had started soon after the boy turned ill for the second time, and was now very well marked.

Was this illness, beginning on 3rd August a relapse of Scarlet Fever, or was it a Diphtheritic attack?

The class of cases to which this one belongs is excellently described in Trousseau's "Clinical Manual", translated by the New Sydenham Society. Trousseau regarded it as a true Diphtheritic attack, constituting a most grave and "invariably fatal" complication of the Scarlatina, the words in the translation being; - "When this bad form of the affection of the throat is met with after the acute stage of the attack, coming on suddenly about

the ninth or tenth day, with copious discharge from the nose, deafness and acute pain in the ear, horrible fetor of the breath, great frequency of the pulse, and depression of the vital powers, I look upon it as a Diphtheritic complication of the eruptive fever". Then again, further on, he says; - "The patients certainly sink with all the symptoms of Diphtheritic poisoning, such as a lowering of the general temperature, a small pulse, a fetor of the breath exhaling from mouth and nose, and a general paleness of the skin, a combinations of symptoms certainly not met with in any other disease."

On the other hand; here was a case of undoubted Scarlet Fever in the first instance, there was exposure to cold on the twelfth or thirteenth day of the disease, followed by a return of all the symptoms of Scarlet Fever in an aggravated form, without the rash; symptoms, however, which were more characteristic of Diphtheria than of Scarlet Fever. It may also be held, that the cold would be liable to cause a recrudescence of the initial fever, especially with a tender

throat, but this same cause may have been sufficient to make diphtheria active, if it was latent in the system; and still further we have this complication coming on, about the time that experience has taught us, diphtheria usually follows Scarlet Fever, and therefore the exposure may have had nothing to do with the outbreak.

Finally, by taking a portion of the membrane from the throat, washing it in a 2 per cent boracic acid solution, then immersing it in Löffler's blood-serum, I succeeded in getting the Diphtheria bacillus

Diphtheria, coincident with Scarlet Fever I have never seen. Several cases have seemed like a combination of that kind for a day or two; but the symptoms always rapidly improved, and I never could get Löffler's diphtheria bacillus as in the case detailed above.

Period of Desquamation

In 100 cases which were carefully recorded, and where the exact dates of the beginning of the illnesses were known, the average duration of the desquamation was 44 days, the shortest period being 23 days, and the longest period 64 days.

The following is a classified list of the cases

6 were desquamated in from 20 to 29 days.

24	"	"	"	"	30	"	39	"
39	"	"	"	"	40	"	49	"
22	"	"	"	"	50	"	59	"
6	"	"	after		59 days.			

100 " " " " in 44 days (average).

This gives the greatest number between 40 and 49 days, the next in number being the ten days immediately preceding and the ten days immediately following this period, these being nearly equal. The number desquamated before 30 days ~~is~~ is equal to the number after 59 days.

I did not find that age or sex had any influence on the duration of desquamation. It was finer generally in children than in adults.

although this was modified by the rash; - The more profuse the rash, the more marked the desquamation. In workmen, the peeling was greater from the palms of the hands than in others, the cuticle often coming off in large flakes. In all cases the soles of the feet, particularly the back parts of the heels were always the last to peel, and here also, it was more distinct than anywhere else.

Treatment

Having experienced the treatment of Scarlet Fever patients in hospital and in private practice at the same time, I have been strongly impressed with the marked advantages to the patients themselves, and, quite apart from the question of public health, of having these cases treated in hospital; and away from their friends; especially in reference to the poorer classes, and more especially in reference to their children, no matter how young. The satisfaction we have in knowing exactly how a case is progressing, from constant and accurate observation, from the amount and kind of diet, from the emunctories, from the morning and evening temperatures; and in having our instructions carefully carried out, all combine to give these cases the best chance of recovery; and it has given me the greatest satisfaction to go amongst them in hospital, with no wondering anxiety at night, when a case is specially bad, knowing that everything is being done, as well as we ourselves could do it, and that every emergency is provided for as far as possible.

On the other hand, treating similar cases

in the lower-class houses; and even in the houses of well-to-do people, I have frequently found my advice set aside, and my services rendered useless by some indiscretion on the part of the nurse, who is usually the mother. Here, in addition to the continuous mourning, and the manifest want of skilled nursing, over-anxiety does a lot of harm. The mother is continually and gratuitously advised by the neighbours, and is often induced to try all kinds of nostrums, some of which may be harmless, but more frequently, they are decidedly injurious. She is advised to give whiskey in some form (usually "toddy"); if the neck is the least swollen, to poultice with leeks, or perhaps linseed meal with bacon on the surface. These injurious and obnoxious things, I have seen used along with many other outrageous cures of the ingenious friends, all of which are poured into the anxious mother's ears. But even worse; the child wants to be out of bed, and, being fretful, is lifted on to the mother's knee, where there is not much care taken to prevent cold, and as a consequence, complications

are brought on. In confirmation of this latter point, I may say that out of my 120 hospital cases, one had albuminuria as a sequela, one had rheumatism, and three had running ears; whilst in my private cases, although only about one fourth the number of hospital cases, three had albuminuria as a sequela, two had rheumatism and there were more cases of Otitis than I can remember. These complications were undoubtedly caused by getting out of bed too early, and exposure to cold.

Thus my opinion is, that fever hospitals have other advantages, besides only isolating the infectious sick; and when they become more universal, as they surely will, it will be to the general advantage to remove to them all cases of infection, except possibly those cases where complete isolation can be got at home and with skilled nursing

Treatment of Hyperpyrexia

In two cases of Hyperpyrexia, I have used cold affusion, in a modified form; that is to say, I did not place the patients in a cold bath, and pour buckets of cold water

over them; but I placed them on a waterproof sheeting, and douched them with a large sponge soaked in cold water, doing the front of the body first, rapidly turning them, and doing the back in the same way, and then transferring them to a dry bed as quickly as possible without drying. I shall detail the two cases briefly;—

1. Jane Gibson, aged 9 years, was admitted to hospital on the second day of the rash, which was scanty, and a temperature of $105.2^{\circ} F$, Throat affection moderately severe, girl very restless, and occasionally very delirious. As the temperature would not come lower than $104.6^{\circ} F$ with anti-pyretics, I gave her a cold sponge all over on the fourth day after admission. The sponging occupied altogether only three minutes from the start till she was back in bed again, and the temperature fell from $104.6^{\circ} F$ to $101.4^{\circ} F$ in one hour, whilst the rash became more distinct. The fever did not rise again higher than $102.4^{\circ} F$, and the sponging did not require to be repeated.
2. Annie Elliot, aged 6 years, had a temperature

ranging from $104.4^{\circ} F$ on admission, to $105.2^{\circ} F$ on the fourth day after admission. The throat symptoms were much worse than in the former case; pulse, very quick, and typhoid symptoms just beginning to predominate. The cold sponge brought the temperature down from $105.2^{\circ} F$ the first time it was tried to $102.4^{\circ} F$. It rose to $104^{\circ} F$ next day, when the affusion again brought it down to $102^{\circ} F$. The affusion was repeated once daily for four days, and every time it was used, the temperature dropped at least two degrees. The fourth affusion brought the temperature down to $100^{\circ} F$. Next evening it was $100.4^{\circ} F$ and three days later it became normal. These results, I think, were very satisfactory; there always being an amelioration of all the other symptoms, when the temperature came down, and my little experience of this treatment will make me try it again, should the occasion arise.

For some time now, however, I have been treating cases of delirium, sleeplessness, severe cases of sore throat and also hyperpyrexia by placing the patients in a hot

moist atmosphere; the method employed is as follows;- The bed is drawn into the middle of the ward or room, and a couple of draught screens are drawn round three sides of the bed, and part of the fourth, leaving the other part facing the fire. A blanket is then thrown over the top of the screens, so that the bed is enclosed on all sides and the top except part of the side next the fire; an ordinary bronchitis kettle is kept well filled with boiling water on the fire and to the spout is fixed a tube in sections just long enough to reach from the fire-place to the bed-stead. The steam is kept continually issuing from the end of the tube, and this keeps the patient in an atmosphere of warm and moist air, whilst the air outside the tent is kept as pure as possible. To this method, I believe, I have had several cases of recovery, which otherwise would have died, including the case of Andrew Marshall who had diphtheria following Scarlet Fever. I shall illustrate this treatment with one other case.

A. McGregor, a boy aged 5 years, was

admitted to hospital, on January 29th 1893, late at night. On being called to see him that night, I found his temperature $104.8^{\circ} F$, pulse over 130, the rash in large, distinct, irregular patches all over the body and extremities, tonsils much swollen and of a deep red colour, which on examination spurted out blood, although no force was used. Albumen was present in slight quantity, and the boy was delirious. Next day the tonsils were covered with false membrane. (pultaceous). The boy was placed in the tent of steam that night, and the case, which threatened to be most severe improved rapidly, and at the end of eight days, the temperature was normal, and desquamation beginning. ¶

I have frequently seen patients who had been sleepless for three or four nights get their first sound sleep after being placed in this tent; also in bad throat cases, where the sleep was short and disturbed, and the patient appearing almost to choke at every inspiration; these I have known to sleep much longer, and the breathing become

Comparatively quiet and easy soon after being put into the tent. The delirium I have always found to be modified, and the temperature reduced. The fall of the temperature was generally the last good sign to come, and from this, I am led to think that this treatment lowers the temperature as a secondary result to the calming of the delirium or to the ease given to the sore throat; or it may be to the rest which is here obtained for the first time.

In the "Medical Annual" for 1893, Professor Henoch is quoted as the authority for the statement that the high fever is the cause of the dangerous cerebral symptoms, and one would therefore suppose that the delirium could not be modified till the temperature came down. This is not in accordance with what I have observed in the treatment by the tent, and I do not think that high fever is always the cause of the delirium which I take to be one of the dangerous cerebral symptoms.

I have at the time of writing this paper

a boy aged nine years under treatment for Scarlet Fever, who was sleepless and very delirious for three nights at the beginning of the fever, although his temperature was never higher than $102^{\circ} F$.

I have also a man, aged 22 in the third week of typhoid fever, whose temperature is ranging between $100^{\circ} F$ and $102^{\circ} F$ and who has been delirious for two days. The temperature here is surely not the cause, - or at least not the whole cause, - of the delirium. But to return to our treatment.

One can easily understand, at least, how a warm moist atmosphere should soothe the sore throat, and in that way help to relieve the nervous symptoms.

In deciding whether to treat a case by this tent method or by cold affusion I would be inclined to try the former in all cases of severe sore throat or delirium, or any of these two with hyper-pyrexia or ^{all} ~~at~~ together; but where there was high fever only, without any of the other symptoms being urgent, I

would consider it advisable to first try cold affusion.

Appendix

Since writing the foregoing, the antitoxin treatment of diphtheria has come very much into favour, and that treatment might be applied in diphtheria after Scarlet Fever as in the case of ^{Andrew} ~~John~~ Marshall (pages 15-17)