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OBSERVATIONS

ON

CERTAIN ERUPTIONS OF THE SKIN

WHICH OCCUR AFTER

RECENT OPERATIONS AND INJURIES:

A THESIS FOR THE DEGREE OF M.D. IN THE UNIVERSITY OF CAMBRIDGE.

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OBSERVATIONS ON CERTAIN ERUPTIONS OF THE SKIN WHICH OCCUR AFTER RECENT OPERATIONS AND INJURIES.

By EDWARD C. STIRLING.

THE attention of surgeons has of late years been frequently called to the fact, that recent wounds are liable to be followed by an eruption closely resembling that of scarlet fever. Nearly all those who are familiar with surgical practice will, I believe, admit not only the existence of these rashes, but also that, in point of time, they occur in such definite relation to recent wounds as to justify the belief that they are in some way due to the infliction of those wounds. But as to the true intrinsic nature of the rashes themselves all are not equally agreed; while some affirm, others deny a scarlatinal origin. Although the balance of evidence hitherto recorded has been, I think, in favour of those who hold the former view, yet it must be admitted that the many anomalies and variations, both in the eruption and in the other associated symptoms, as well as the absence of any reasonable explanation of their occurrence under these circumstances, have left the matter still debatable, and not unworthy of more complete investigation.

In the following paper I have brought together all the facts I have been able to collect which seem to throw any light upon the subject; and though I do not claim any striking originality for the views and explanations advanced here, yet I venture to think that I may have done some service by collecting, and analysing to some extent, the very scattered and fragmentary notices that exist on a most interesting question. I trust that future investigations by those more competent than myself may cause further light to be thrown upon it.

The subject may, perhaps, be most conveniently introduced by a brief recital of the notes of a case which actually happened, and which sets forth most of the phenomena to be considered. It occurred in the practice of a London hospital, under my own care; and after the outbreak of the untoward symptoms, I had the benefit of the advice and assistance of my friend and colleague Dr. Whipham, whose interest in the whole question involved was not less than my own.

T. G., a boy, æt. 6, well nourished, but of delicate aspect, with thin fair hair and pink cheeks, was admitted on the 22d January 1879 with an exostosis about the size and shape of half a large walnut on the lower end of the left tibia. This had been growing for two years, and now pained him in walking and caused him to limp, so that it was decided after consultation to remove it. As the case was well suited for examination purposes, the operation was deferred for a few days, the boy meanwhile paying a visit to Lincoln's-inn-fields, where the examinations of the College of Surgeons were then proceeding. On the 30th January, eight days after admission, the exostosis was easily removed under the strictest antiseptic precautions, the patient being to all appearances in excellent health and spirits. On the evening of the same day he seemed to be well and comfortable, with a perfectly normal temperature and pulse. He was so again on the following morning, though by evening his temperature had risen to 101·2°. On the next morning, that is on the second day after the operation, he was in a state of high fever, with a flushed face, high temperature (104°), rapid pulse (156), and quick shallow respiration of 56 to the minute. The whole of the body and limbs were covered with a bright, scarlet, punctiform rash, fading on pressure, and not elevated or perceptible to the touch. The tongue was coated with a yellowish-white fur, and its papillæ were red and prominent about the edges and tip. He complained a little of his throat, and the fauces and soft palate were found on inspection to be uniformly reddened and congested. In short, both to me and to my colleague, the boy appeared to have undoubtedly all the symptoms of scarlatina, and he was at once removed to an isolated ward. On dressing the wound, antiseptically as before, its edges were somewhat swollen, but there was no sign of suppuration, nor was the rash more distinct around the wound than elsewhere. It may here be remarked that his parents stated that he had previously had measles and chicken-pox, but not scarlatina; that they were not aware of the existence of this disease in their neighbourhood; and that in their knowledge he had not been in any way exposed to infection from it. On the following day, February 2d, the rash became duskier, but in other respects he remained in the same condition. On the 3d the presumably scarlatinal symptoms remained unchanged, but he had in addition a uniformly bright, erythematous patch about four inches long over the back of the

left wrist-joint, which disappeared not very readily under considerable pressure. On the 4th the symptoms seemed generally more favourable, though the rash was still as bright as before; but he now for the first time complained of pain in the wound, and there was besides extreme cutaneous hyperæsthesia over the whole body, so that the boy cried out with pain on the slightest contact of the fingers with the skin. On the 5th a trace of albumen in the urine was noted for the first time, it being also loaded with lithates. He remained, with little variation, in about the same condition till February 7th, when both elbows were found to be red, swollen, and painful. The right hand and forearm were also swollen and œdematous, while the swelling and redness previously noted over the left wrist had disappeared. Both knee-joints were painful, but not swollen, and on the following day there was a purplish black, irregular, slightly elevated patch on the instep of the left foot, which looked like commencing dry gangrene. The left knee was swollen, and the left calf and ankle œdematous. The wound itself meanwhile had become very foul and sloughy, with thick everted edges, and with much discharge of fœtid pus. On February 9th he was evidently sinking rapidly; the swellings above mentioned had increased, and the inguinal glands on both sides were enlarged. The general rash was still distinct, though fainter than before, and desquamation had commenced freely on the face and chest. He died during that afternoon.

At the post-mortem examination purulent fluid was found in both knee- and both elbow-joints, and their synovial membranes were very red and vascular. In both kidneys there were various points of congestion, one of which, near the surface, had passed into necrosis. None of the veins examined contained coagula, but those in both groins were swollen to nearly treble their normal size.

We have here, then, the case of a boy in apparently perfect health, who had not been exposed to any known source of infection, but who nevertheless was attacked with an eruption and other symptoms exactly resembling scarlatina, on the second day after an operation of no great gravity.

The case was further complicated by the subsequent development of pyæmia, with which also were associated certain cutaneous symptoms. It will be as well here to state distinctly that it is not my intention to include in the present paper a full consideration of those eruptions of the skin which are occasionally seen, usually as the immediate precursor of death, in cases of pyæmia and septicæmia. These have definite characters of their own. They are more usually of the nature of purpuric or livid

patches, vesicles, pustules, and bullæ, though they may, no doubt, be of the nature of erythema also, and may then very closely simulate the rash of scarlatina.* They have been very fully described by Wilks, Henry Lee, Braidwood, Verneuil, Tremblat, and others. Though it will be impossible to avoid some allusion to this class of cases, I desire now, as I have said, rather to confine myself to those eruptions, usually of much less grave import, and often very transient, which occur at an early period after the infliction of a wound or injury, and which have hitherto received less attention at the hands of surgeons.

It is true that the eruptions occurring in pyæmia may differ only in degree from those now under consideration, which I venture to term traumatic; just as it is probable that septicæmia and pyæmia differ only in degree from simple surgical fever, each being the result of some infection of the system, similar in kind, only of vastly different degree: but as we view surgical fever and pyæmia in a very different light as regards their clinical import, I do not hesitate here to draw a clear distinction between the rashes characteristic of the traumatic, as opposed to the pyæmic state, and to confine myself to a consideration of the former.

Assuming the case quoted above to have been primarily one of scarlet fever, it would not be more remarkable that this disease should occur in a person just operated on than in any other patient. For although in this particular instance no source of infection could be traced, nor had there been any case in the hospital for several months (infectious cases being excluded from admission by a recent law of the institution), yet, as scattered cases are continually occurring in large towns, it is quite possible, and even probable, that he might have contracted the disease from visitors to the ward, or during his visit to the College of Surgeons, and that it was a mere coincidence that it manifested itself soon after the operation. But this is not an isolated case. I hope to be able to show that the occurrence of scarlet fever after wounds, as well as that of a

* See below, in a case reported by Mr. Harrinson, in the *British Medical Journal*.

non-infectious rash resembling it, is a matter of tolerably frequent observation of late years.

The earliest reference to eruptions occurring in the traumatic state* that I can find is made by Civiale, who states that 'it is not uncommon to notice, particularly in patients with vesical calculi, either during the acute pains caused by the stone, or after any surgical operation, papules, petechiæ, and coppery patches.'† Elsewhere, in the same work, he again states that these eruptions are associated with calculi, and cites a case where an eruption of large, red, painful papules and patches made its appearance two days after lithotrity.

In the same year M. Germain See‡ noticed an eruption, closely resembling that of scarlet fever, after an operation.

In 1863 Maunder,§ at the Pathological Society, reported a case of median lithotomy in a child of 6 years, in whom, on the day following the operation, there were thirst, heat of skin, probably sore-throat, and a rash, considered to be that of scarlet fever.

A discussion thereupon took place in the society, and various cases of eruption after operation were cited by Drs. Graily Hewett, Broadbent, Crisp, Harley, and Messrs. Spencer Wells and H. Lee. Except in Mr. Maunder's case, just quoted, no mention is made of any general symptom accompanying the rash, though this is variously described as a 'livid blush,' or a 'scarlet erysipelatous blush,' as 'scarlatinal,' and in one case, as being distinctly of the nature of urticaria. The one point in which they all agreed was in their occurrence within a day or two, or even within a few hours, of an operation.

In the same year Mr. Harrinson, at a meeting of the Reading branch of the British Medical Association, related a case in which, on the third day after a compound dislo-

* The traumatic state is, as I understand it, that peculiar state of system often associated with febrile symptoms, which may occur in the subjects of recent injuries or operations. When it exists to a marked degree we know it more familiarly as surgical or inflammatory fever.

† *Traité Pratique sur les Maladies des Organes Genito-urinaires*, t. iii. p. 596 (1858).

‡ Reported by Trélat, *Progrès Médical*, September 14th, 1878.

§ *British Medical Journal*, 1863, vol. ii. p. 679.

cation of the thumb, the result of an accident, a scarlet efflorescence appeared on the chest and on the inside of the arms, but on no other part. The fauces were not reddened, nor was there any sore-throat. The man died on the same day on which the rash appeared. In this case it was absolutely necessary to come to some decision as to whether the man died of scarlet fever or from the effects of the accident, as an insurance policy was concerned. For various reasons it was considered that the eruption was not that of scarlet fever, but due rather to pyæmia.*

Another case of scarlet eruption of doubtful nature, occurring after a wound of the head, was reported about the same time by Mr. George May junior.† It appeared on the sixth day after the accident, was associated with fever, and was followed by complete desquamation, but there was no sore-throat. The boy was believed to have had scarlet fever previously. There was no case in the village, and no one in the same house had similar symptoms either before or afterwards.

Tremblay also, in the *Gazette Hebdomadaire* for 1870,‡ quotes certain instances of traumatic eruptions, which, however, appear not to have had any resemblance to scarlet fever, but to have been rather of the nature of urticaria. These will be again referred to.

All the cases above enumerated, with one or two doubtful exceptions, point to the existence of a non-infectious rash, rather than that of scarlet fever; but they sufficiently show that it was already a recognised fact for operations and injuries to be followed by an eruption of some sort.

It was not until the publication of the *Clinical Lectures* of Sir James Paget in 1875 that attention became fully directed to the possible connection between scarlet fever and recent wounds. Sir James cites a number of cases in his own practice where an operation was followed within

* *British Medical Journal*, 1863, vol. ii. p. 633, and 1864, vol. ii. p. 390. There is, I think, little doubt but that this was its true nature. The case is mentioned here merely to show that these rashes had begun to excite attention, and that the diagnosis was attended with difficulty.

† *British Medical Journal*, vol. ii. p. 428.

‡ No. 35.

a week by a scarlet rash and febrile symptoms, together so closely resembling scarlet fever that he could arrive at no other conclusion than that they were, in truth, of that nature.

Eight other cases of a similar character are quoted, in an appendix to the same volume, by Mr. H. Marsh, from the records of the Children's Hospital in Great Ormond-street; and six others in the practice of Mr. Thomas Smith. These surgeons were also of opinion that the rash was scarlatinal.

Subsequent to the appearance of Sir James Paget's lectures there appeared in the medical journals at various dates several notices of rashes occurring in the traumatic state. The evidence for or against scarlet fever is not always decisive; but the different accounts prove, at least, that of whatsoever nature they were, their occurrence under these circumstances was not unfrequent; and further, Trélat, in 1879, in the *Progrès Médical*, after relating some cases in his own practice, and in that of his friends, summarises many of those previously quoted, and comes to the conclusion that the complications which sometimes occur after operations are due to scarlatina in a modified form. But whilst fully recognising that these rashes are not to be confounded with those other eruptions which are more strictly indicative of septicæmia, he makes no mention of the possibility of the occurrence of simple traumatic rashes which are not scarlatinal, and believes that in all cases they are indubitably of the nature of scarlet fever.

As I have already ventured to assert, I think there is evidence to show that we may, in fact, have two classes of traumatic eruption—one veritable scarlet fever, to which the existence of a wound in some manner renders certain individuals peculiarly liable; the other consisting of non-infectious rashes, often easily recognisable as simple erythema, urticaria, or herpes, but often again so like the eruption of scarlet fever, and associated with some symptoms commonly found in that disease, as to make a differential diagnosis almost impossible where a definite history of infection is not forthcoming.

The occurrence of both these classes of eruption in such a definite relation in point of time to the infliction of a wound or injury suggests irresistibly the belief that the wound is in some way the cause of their appearance; that they may, in fact, be truly called traumatic eruptions.

We have now to examine more minutely, and to set forth the available evidence in support of the propositions I have asserted; and I will endeavour to establish *seriatim* the following points:

1. That in a large proportion of cases the eruption in question is that of scarlatina.

2. That it occurs so constantly as the immediate sequel of an operation or injury, as to warrant the assertion that it is in some way connected with the presence or infliction of the wound.

3. That the disease, when it occurs under these circumstances, often departs from the normal type of scarlet fever.

4. That simple non-infectious rashes may, in like manner, occur in the traumatic state: and

5. That the cause of these also must be referred to the existence of the wound or injury.

To justify our assumption, that a case is one of scarlet fever, it is not necessary to demonstrate the presence of all the symptoms usually found in that disease, or that these should run a strictly normal course. We may undoubtedly have a specific fever without the rash usually attending it, and, when the rash does appear, it may vary in extent and in character; and we may admit that scarlet fever may be accompanied by a very slight rash, or by no rash at all. Neither can we regard the absence of sore-throat as a proof of the absence of scarlet fever, though the presence of angina, especially when accompanied by certain other symptoms, goes far to confirm suspicions of that disease.

The only absolutely conclusive proof of the nature of a given case where the symptoms were largely abnormal would be, I apprehend, either to demonstrate a source of infection or to show that the disease in question was transmitted to others brought in contact with the individual or

his surroundings. But this is often quite out of the question. Nearly every one has met with cases both of scarlet fever and of other infectious diseases where it is absolutely impossible to trace any source of infection, where even it would seem probable that none could exist.

It will, therefore, not be a matter of surprise that we shall very often be unable to avail ourselves of this proof positive. Consequently we must at the outset admit the great difficulty of defining with precision what collection of symptoms shall entitle us to pass a verdict of scarlet fever. Rash, sore-throat, albuminuria, desquamation may each of them be absent, or may vary to almost any extent; and while the coincidence of several of these symptoms renders a diagnosis tolerably easy, the absence of one, or more than one of them, by no means indicates that the case is not one of scarlet fever.

All we can do is to examine carefully and honestly the cases at our disposal, and to see whether they, individually and collectively, present such an aggregation of symptoms usually found in the disease in question as to afford a reasonable presumption of their nature. Where we can actually demonstrate a source of infection, our arguments will be thereby so much the more strengthened.

Let us then, with these reservations, examine carefully the details of the cases available for our purpose, to many of which brief allusion has already been made.

Among the eleven cases of eruption after operation instanced by Sir James Paget, particulars are given only in that one which served as the text for his remarks. In it, besides the rash described as exactly like that of scarlatina which appeared on the day after the operation, there occurred also general febrile disturbance. These symptoms subsided in a few days; but at the end of a month the patient had severe pain in passing water, with marked hæmaturia. Two days afterwards there was sore-throat, and the eruption reappeared and continued for ten days. In another ten days the urine became normal, and the boy eventually recovered.

In the remaining ten cases we have no individual par-

ticulars; but it is stated that they occurred during an epidemic of scarlet fever; that they resembled the case just quoted in presenting certain deviations from the normal type of scarlatina; and that in some there was no sore-throat, in others no desquamation.

Besides the evidence, not thoroughly convincing, it is true, afforded by the details of the case in which particulars are given, and the fact that there was an epidemic of scarlatina prevailing at the time, we must have due regard to Sir James Paget's own weighty opinion, which is decidedly in favour of their scarlatinal origin.

The eight cases of Mr. Howard Marsh, in the appendix to Sir James Paget's lectures, have been mentioned. As seven at least of these are included among a larger number that I myself have collected, reference will again be made to them in the analysis of the table in which they stand. I will, however, here only remark that Mr. Howard Marsh also clearly expresses his opinion that they were scarlatinal.

In seven cases occurring amongst forty-three lithotomies, in the practice of Mr. Thomas Smith,* the characteristic eruption appeared in all, albuminuria alone in two, desquamation alone in two, albuminuria and desquamation together in one. In the remaining two, neither albuminuria nor desquamation occurred; but in one, there were, besides the rash, rigors, high fever, and a temperature of 104·6°.

No notice is made of sore-throat; but I shall hereafter have occasion to point out that this symptom is very often absent, or exists only to a slight degree in the class of cases in question.

If we neglect the two cases in which desquamation only is mentioned as having been present besides the rash (for desquamation may follow any erythema or hyperæmia of the skin, thereby increasing the difficulty of diagnosis), we have still three followed by albuminuria, which is a

* An unusually large proportion, as Mr. Smith remarks; and the proportion is larger than the figures represent; for amongst the thirty-six who escaped, there were, no doubt, some who had had scarlet fever, and were thereby in a great measure protected against a second attack (Paget's *Clinical Lectures*, note xvii. by Mr. Howard Marsh).

much more convincing and reliable symptom. In another case the rigors and high temperature, together with the rash, suggest very strongly the true nature of the disease, though they do not by any means absolutely prove it.

Here I might say that it is, in a measure, sufficient for my purpose to have demonstrated the existence of a rash; for though I am at present endeavouring to prove a scarlatinal origin for many of the cases in point, yet it will be borne in mind that I wish later to show that they are not all of that nature. It would therefore be right for me, in considering the latter class of cases, to avail myself of those to which exception is here taken.

M. Trélat* relates two cases that came under his own observation, and another in the practice of one of his pupils.

A child, after slow convalescence from measles, had an abscess in the thigh, partly subaponeurotic, partly subcutaneous, which was considered to be due to an affection of the bone. This was emptied by means of a drainage-tube, which was removed at the end of fifteen days. One orifice healed, the other remained open. At the end of three weeks compression was exerted, but a fistulous track remained. M. Trélat therefore laid open the sinus with a pair of scissors. On the following day there was a sharp attack of fever, sore-throat, and, in less than twenty-four hours, a general scarlatiniform eruption, which was diagnosed by his colleague, M. Hardy, as scarlet fever. Desquamation occurred; but the termination of the disease, in this respect and in others, presented certain irregularities.

In the second case, a young man, of a profoundly lymphatic temperament, had, besides superficial scrofulous ulcerations on the hands and buttocks, an abscess in the epididymis, probably of scrofulous origin, and also a cold abscess above the pubes.

The small abscess in the epididymis was opened, and the contents of the cold abscess evacuated with an aspirator. Next morning the patient became markedly feverish, depressed, and fatigued, and vomited whatever he took.

* Loc. cit.

On the following day the general indications pointed to an eruptive fever, and on the next appeared a scarlatinal rash, with the characteristic sore-throat. M. Hardy diagnosed scarlet fever in this case also. The fever developed regularly, and albuminuria in time revealed itself, which, however, disappeared after some days, on the evacuation of some pus that had accumulated in the supra-pubic abscess.

M. Trélat quotes also a case occurring to one of his pupils, M. Cartaz, who, during the Franco-German campaign of 1870, resected a knee four days after a gunshot wound. On the third day after the operation a scarlatinal rash appeared, accompanied by high fever. No scarlatina was known to exist in the camp at the time, but two cases occurred ten days afterwards.

In carefully reviewing these cases M. Trélat comes to the conclusion that they were scarlatina, and in this opinion he is confirmed by the high authority of M. Hardy; a conclusion to which, I think, the evidence most certainly points.

Henoch* also mentions the case of a boy who was suffering from a large pectoral abscess, the result of a blow. This was opened under carbolic spray, and treated antiseptically, and with a drainage-tube. On the two following days he appeared to be doing well, the temperature not exceeding 101·3°; but on the third day after the operation there was marked redness of the face, arms, and inner surface of the thighs; this spread over the back, thorax, arms, and legs. The tongue was white in the middle, with the tip and edges red. There was marked sore-throat, and the temperature ranged from 98·3° to 99·5°. In two days from its first appearance the rash began to get paler; there were many miliary vesicles on the upper part of the thigh, and the tongue became red and smooth, with prominent papillæ.

In another day the rash and vesicles had completely disappeared, and the temperature became absolutely normal.

Ten days after the appearance of the eruption there

* *Charité Annalen*, iii. Jahrgang 1876.

was copious desquamation over the whole body, which lasted for twelve days.

Henoch, in remarking upon this case, considers it to have been one of scarlet fever, on account of the rash, angina, milaria, and characteristic peeling; but he notes the very rapid subsidence of the fever, which he states was quite opposed to his previous experience. It should be added that an epidemic of scarlet fever was prevailing at the time.

The following cases are quoted from a paper by Dr. Braxton Hicks on puerperal fever in the *Transactions of the Obstetrical Society*, vol. xii.

A few days after lithotomy, by Mr. Jonathan Hutchinson, the patient was covered by a scarlet-fever rash, and on inquiry it was found that the bed had been previously occupied by a scarlet-fever patient.

A gentleman had a cyst removed from the neck. On the third day afterwards he was feverish, with a furred tongue; and the wound looked unhealthy. On the fourth day there was a rash, like that of scarlet fever, with a slight sore-throat. After the fifth day the symptoms subsided, and were all gone by the ninth day. On the seventeenth day after the eruption appeared, his wife was attacked with scarlet fever.

Bryant* mentions the case of a lady who had had ovariotomy performed. On the fourth day a scarlet-fever rash appeared all over, and ran its course without detriment to the operation. The skin subsequently desquamated.

In the first of these cases the source of the infection is so clear and so direct that we have no right to assume that the operation had anything whatever to do with it, unless it could be shown that the patient had occupied the bed for a considerable period before the operation without contracting the disease, which, however, is not stated to have been the case.

In the second case the nature of the eruption is clear from the subsequent communication of infection.

In the third instance the presumption is in favour of scarlet fever, as the symptoms seem to have run a strictly normal course.

* *Clinical Surgery*, part vii.

The following instance is striking, and perhaps shows in a marked degree the increased liability to the infection of scarlet fever produced by a wound, though in this case no rash was present.*

An abscess was opened for acute necrosis of the tibia in a man, whose age is not stated. The temperature, previously 101°, rose to 104°, and the wound became phlegmonous. There was no sore-throat, but his skin desquamated, and he had albuminuria.

It was shown that one of his children had previously caught scarlet fever, and subsequently all were affected. This man was the only adult who contracted the disease in an epidemic in which a number of children suffered.

Mr. G. R. Moore† instances three other cases of eruptions immediately following injuries, which he assumes to have been scarlet fever. The details given, however, are insufficient to base an opinion upon; and I have therefore thought it more prudent to treat of these in a subsequent section as simple non-infectious rashes, and not scarlatinal, though it must be admitted that the details given by no means preclude the possibility of their having been of this nature.

Hitherto I have availed myself only of instances quoted by other surgeons; I now come to a large group of thirty-nine cases, particulars of which I have myself collected, chiefly from the records of the Children's Hospital in Great Ormond-street, but partly also from St. George's. Together they constitute the first thirty-nine cases of the appended table.

Regarding, at present, only the evidence throwing light upon the nature of the disease in these thirty-nine cases, it will be seen that, besides the rash which was present in all of them, except, perhaps, No. 5, in eight only there is a clear history of possible infection from scarlet fever or of its transmission to others. In six albuminuria is stated to have occurred, and in seven desquamation.

These in themselves, it must be admitted, are not very

* Mr. J. A. Lea, *British Medical Journal*, February 15th, 1879.

† *British Medical Journal*, December 7th, 1879.

complete or satisfactory statistics.* But there is this important fact which must be borne in mind, in the Great Ormond-street cases at least, and to which such full share of weight must be allowed as is due to strong presumptive evidence, viz. that immediately on the outbreak of the suspicious eruption, the children were at once removed to the fever ward. There they remained under treatment and observation till they had recovered; and the subsequent course and progress of the disease raised no doubt whatever as to its nature in the minds of the able physicians who had charge of the cases. And further, though thus brought in contact with other children suffering from indisputable scarlet fever, there was no outbreak of any symptoms other than those with which they had been admitted into the fever ward. One case is especially noticeable (No. 16), for while no other source of infection could be traced, it seems certain that the disease was derived from the operating surgeon, whose children were ill with scarlet fever at his own home. In my own case, related at the outset, there is evidence equally striking as regards transmission of infection; for I regret that in that too it seems likely that it was conveyed either by the surgeon or house-surgeon. One day, after dressing the wound, we went directly to examine a little girl in one of the general wards. No case of scarlet fever had been in the hospital for several months, except the case we had just left, nor were the parents of the child aware of the existence of scarlet fever in their neighbourhood; yet six days after my examination the child vomited, became feverish, and the day after developed a marked scarlatinal rash. She was immediately removed to a fever hospital, where, I have ascertained, the disease ran a mild and normal course.

In these two cases the evidence of the direct transmission of infection is so clear as not to be gainsaid.

Now therefore, although direct proof of the nature of the disease is only forthcoming in a certain small proportion of cases, yet I venture to urge that there is strong presumptive evidence in favour of their having been all

* The older records were in many instances wanting in some necessary particulars, or I feel convinced that much more satisfactory statistics might have been made out.

of a similar nature. The opinion of highly competent physicians, the fact that they all remained under observation and apparently ran a similar course, and that no observations whatever are recorded which tend to throw doubt upon this point,—all these facts, I say, point to the conclusion that all the cases were of the same essential nature, that they were, in fact, scarlet fever.

Granting the point, however, that the above-mentioned cases are truly scarlatinal, we have as yet advanced no farther than establishing the fact that a person recently operated on may have an attack of scarlet fever, a proposition which in itself manifestly does not require demonstration. But the essence of the whole matter and the chief point of my argument is that these persons contracted scarlet fever by reason of some predisposition to it conferred by the wound—that the disease was not merely *post hoc*, but *propter hoc*. As in attempting to show this more difficult point I shall have to trust almost entirely to the data afforded by these cases, I apprehend it is only right and logical to have first attempted to demonstrate their nature.

Assuming that the nature of the foregoing cases has been successfully established, I pass on to a consideration of their further details, to see whether these warrant the assertion that the symptoms depend on, or are influenced by the presence of the wound. And here it will be again recalled to mind that, even if exception should be taken to the scarlatinal character claimed for some of the cases under consideration, my arguments are not thereby entirely invalidated. Nothing can obliterate the fact that in all of them, except perhaps one, a wound or injury was followed by a rash of some sort. I am endeavouring now to show that this rash is very frequently scarlatinal; but if that character be denied in a particular instance, it must assuredly find its place in the category of non-specific traumatic rashes; that is, if I can show that there is truly a genetic connection between the wound and the rash.

To demonstrate conclusively that a wound or injury predisposes to scarlet fever, I ought to be able to show (1) that a larger proportion of cases with wounds contract scarlet fever than those without; and (2) that there is a

certain definite relation, in point of time, between the infliction of the wound and the outbreak of the symptoms. On the former point I am not able to offer any satisfactory evidence.

The total number of cases of scarlet fever intercurrent in surgical cases, in a period of about twenty years at Great Ormond-street Hospital, was 163; out of these thirty-one were cases of operations, followed immediately by the symptoms claimed to be those of scarlet fever, which is not of itself a remarkable proportion. But I am convinced that this is nothing like a true ratio, and that the number of cases occurring after operations should be increased. The older records of the hospital to which I had access were not unnaturally found deficient in certain points which were not then matters of interest or speculation. Many of the smaller operations, such as the opening of abscesses, &c., are often not recorded at all, though plainly inferred from the subsequent remarks; and these slighter operations, as I shall have occasion to point out, are the very ones, perhaps, which are most frequently followed by the symptoms in question. In other cases dates are not given with sufficient precision to permit of their being made available for accurate statistics.

On this head, however, Sir James Paget is very explicit. He says: 'In private practice I do not remember to have seen scarlet fever supervene in any surgical cases, except those in which operations had been performed; and in hospital practice I doubt whether it is much more frequent among all the other patients taken together than it is in those who have been operated on.'*

With regard to the relation, in point of time, between the infliction of the wound and the outbreak of the symptoms, I believe I shall be more successful, and on this point my argument must mainly depend.

To make these and other subsequent details more conveniently evident, the total number of sixty-three cases, which have already been briefly alluded to, are now given in a tabular form.

* *Clinical Lectures*, first edition, p. 350. See also Dr. Gee's article, 'Scarlet Fever,' *System of Medicine*, vol. i. p. 350; and Ziemssen's *Cyclopædia*, Eng. translation, vol. ii. p. 184.

Table of Cases of Scarlet Fever following Operations and Injuries.

No. of case.	Name.	Sex.	Age. y. m.	Date of admission.	Disease for which admitted.	Nature of operation.	Date of operation.	Date of scarlet fever.	No. of days after operation.	Remarks.
1.	W. F.	M.	2.9	Jan. 19.	Necrosis.	Removal of bone.	Jan. 19.	Jan. 20.	1	
2.	H. N.	M.	3.	„ 16.	Strangulated hernia.	Herniotomy.	„ 16.	„ 19.	3	
3.	T. M.	M.	3.6	June 24.	Disease of tarsus.	Removal of bone.	June 29.	June 30.	1	Scarlatina anginosa.
4.	A. B.	M.	9.	July 6.	Fatty tumour.	Removal.	July 8.	July 9.	1	Albuminuria.
5.	A. G.	M.	4.	June 16.	Perinæal abscess.	Opened.	June 16.	June 17.	1	D.* Scarlatina maligna. General duskiness of skin rather than rash.
6.	W. H.	M.	7.	April 11.	Enlarged tonsils.	Removal.	April 17.	April 19.	2	Infection traceable.
7.	E. F.	F.	2.6	Dec. 12.	Croup.	Tracheotomy.	Dec. 12.	Dec. 17.	5	D.* Infection traceable. Albuminuria.
8.	K. M.	F.	3.	Oct. 16.	Diphtheria.	„	Oct. 16.	Oct. 19.	3	D.*
9.	L. A.	F.	3.	June 19.	Cleft palate.	Staphyloraphy.	July 4.	July 6.	2	
10.	M. A. B.	F.	3.	—	„ „	„	Aug. 26.	Aug. 27.	1	
11.	J. L.	M.	5.	Oct. 31.	Calculus vesicæ.	Lithotomy.	Nov. 4.	Nov. 6.	2	
12.	B. W. T.	M.	5.	Jan. 27.	Croup.	Tracheotomy.	Jan. 31.	Feb. 3.	3	D.*
13.	K. C.	F.	6.	April 30.	Morbus coxæ. Abscess.	Aspiration.	May 15.	May 17.	2	Infection traceable.
14.	M. H.	F.	1.10	„ 19.	Disease of ankle.	Syme's operation.	April 28.	April 29.	1	D.*
15.	A. C.	F.	1.9	July 22.	Cleft palate.	Staphyloraphy.	July 23.	July 24.	1	
16.	C. W.	F.	3.	Sept. 6.	„ „	„	Sept. 8.	Sept. 10.	2	Infection traceable.
17.	H. H.	M.	4.	„ 16.	Calculus vesicæ.	Lithotomy.	„ 16.	„ 19.	3	Albuminuria. Desquamation.

* Those cases marked D, were fatal.

18.	E. P.	M.	2.	Jan. 31.	Webbed fingers.	Plastic operation.	Feb. 14.	Feb. 16.	2	Desquamation. Infection traceable.
19.	J. B.	F.	9.	March 2.	Morbus coxæ. Abscess.	Opened.	March 19.	March 20.	1	
20.	J. C.	M.	7.	April 17.	Calculus vesicæ.	Lithotomy.	April 20.	April 22.	2	Infection traceable. Albuminuria. Desquamation.
21.	J. R.	M.	3.	Sept. 3.	Cleft palate.	Staphyloraphy.	Sept. 10.	Sept. 11.	1	
22.	W. S.	M.	2.10	May 23.	Croup.	Tracheotomy.	May 26.	May 27.	1	
23.	W. D.	M.	3.	April 14.	Malformation of fingers.	Plastic operation.	April 21.	April 24.	3	
24.	E. J.	M.	2.9	Sept. 13.	Fatty tumour.	Removal.	Sept. 16.	Sept. 18.	2	
25.	E. H.	M.	5.9	March 7.	Psoas abscess.	Opened antiseptically.	March 12.	March 15.	3	Slight sore-throat.
26.	F. H.	M.	5.4	Oct. 22.	Hare-lip.	Operation.	—	Oct. 27.	Less than 5.	Infection traceable.
27.	A. D.	F.	3.	Sept. 26.	„	„	—	„ 2.	Less than 7.	
28.	—	M.	4.6	Oct. 31.	Disease of tarsus.	Removal of bone.	Nov. 2.	Nov. 4.	2	
29.	H. M.	M.	5.6	„ 10.	Disease of ankle.	Sinuses laid open.	—	Oct. 20.	Merely stated that the operation was followed by scarlet fever.	Anasarca. Albuminuria.
30.	S. P.	F.	5.	—	Supernumerary toes.	Plastic operation.	—	„ 18.		
31.	M. J.	F.	7.	Oct. 11.	Abscess in thigh.	Opened.	—	„ 19.		
32.	F. L.	M.	8.	Aug. 25.	Burn.	—	—	Aug. 29.	4	Desquamation.
33.	H. P.	F.	9.	Nov. 3.	Contraction of sterno-mastoid.	Tenotomy.	Nov. 8.	Nov. 9.	1	
34.	E. T.	F.	20.	Dec. 2.	Varicose veins.	Ligature.	Dec. 5.	Dec. 7.	2	Desquamation.
35.	G. R.	M.	12.	Aug. 25.	Talipes.	Tenotomy.	Sept. 9.	Sept. 10.	1	
36.	W. F.	M.	8.	—	Disease of knee.	Amputation of thigh.	April 26.	April 29.	3	Desquamation. Albuminuria.

No. of case.	Name.	Sex.	Age. y. m.	Date of admission.	Disease for which admitted.	Nature of operation.	Date of operation.	Date of scarlet fever.	No. of days after operation.	Remarks.
37.	J. C.	M.	25.	Jan. 18.	Accident.	Amputation of arm.	Jan. 18.	Jan. 21.	3	
38.	J. S.	M.	8.	Feb. 12.	„	Amputation of thigh.	Feb. 12.	Operation followed by scarlet fever.		
39.	T. G.	M.	6.	Jan. 22.	Exostosis of tibia.	Removal antiseptically.	Jan. 30.	Feb. 1.	2	D.* Desquamation. Infection communicated to others.
40.	—	—	—	—	Abscess of thigh.	Opened.	—	—	1	Desquamation. Sore-throat.
41.	—	—	—	—	Abscess of abdomen and epididymis.	The latter opened; the former aspirated.	April 12.	April 14.	2	Albuminuria. Sore-throat.
42.	—	—	—	—	Gunshot wound.	Resection of knee.	—	—	3	Infection communicated to others.
43.	—	—	—	—	Not stated.	Not stated.	—	—	1	No details given in cases 43-52 inclusive. It is merely stated that the eruption came out over the whole surface at once, and on the limbs more fully than the face and chest. In some no sore-throat; in others no desquamation.
44.	—	—	—	—	—	—	—	—	1	
45.	—	—	—	—	—	—	—	—	2	
46.	—	—	—	—	—	—	—	—	2	
47.	—	—	—	—	—	—	—	—	2	
48.	—	—	—	—	—	—	—	—	3	
49.	—	—	—	—	—	—	—	—	3	
50.	—	—	—	—	—	—	—	—	3	
51.	—	—	—	—	—	—	—	Within	7	
52.	—	—	—	—	—	—	—	Within	7	
53.	—	—	—	—	—	—	—	—	1	Severe rigors. Temp. 104·6°.

54.	—	—	—	—	—	—	—	—	2	Desquamation.
55.	—	—	—	—	—	—	—	—	2	D.* Anasarca. Albuminuria.
56.	—	—	—	—	—	—	—	Very soon	after.	Desquamation.
57.	—	—	—	—	—	—	—	—	3	Albuminuria.
58.	—	—	—	—	—	—	—	Very soon	after.	Albuminuria. Desquamation.
59.	—	—	—	—	—	—	—	—	2	
60.	—	—	—	—	Necrosis of tibia.	Abscess opened.	—	Very soon	after.	No rash. Desquamation. Albuminuria.
61.	—	M.	—	—	Cyst of neck.	Removal.	—	—	3	
62.	—	F.	—	—	Ovarian tumour.	Ovariotomy.	—	—	4	
63.	M. P.	M.	—	March 9.	Pectoral abscess.	Opened antiseptically.	March 19.	—	3	

Cases 1 to 31 inclusive are taken from the records of the Children's Hospital, Great Ormond-street.
Nos. 32 to 39 inclusive from those of St. George's.
„ 40 to 42 are reported by M. Trélat, *Progrès Médical*, September 14th, 1878.
„ 43 to 52 by Sir James Paget, *Clinical Lectures*.
„ 53 to 59 are quoted by Mr. Howard Marsh in an appendix to the above lectures.
„ 60 is reported by Mr. J. A. Lea, *Brit. Med. Journal*, 1879, vol. i. p. 227.
„ 61 and 62 by Dr. Braxton Hicks, *Transactions of the Obstetrical Society*, vol. xii.
„ 63 by Henoch, *Charité Annalen*, 1876.

It will be seen that the symptoms followed the operation

Within 24 hours in	16	cases, or 25·4	per cent.
On the 2d day in	18	„ „ 28·6	„
„ 3d day in	15	„ „ 23·8	„
Beyond the 3d day, but within 1 week, in	14	„ „ 23·2	„
Total . . .	63*		

Thus we find that while all the cases occurred within a week, in 49, or 78 per cent, the eruption appeared within three days, reckoning only those in which precise dates are given. This number would be still further increased if we were to add, as we might fairly do, those cases in which no definite period is stated, but in which it is nevertheless remarked that the symptoms followed, or immediately followed the operation. The mean of the periods in which the time is definitely stated is almost exactly two days.†

Surely this indicates some relation between the wound and the fever. For if this were not so, there would be no reason why the symptoms should not sometimes occur at longer and variable periods afterwards, and sometimes also before. But we see, on the contrary, that the fever almost invariably occurs within two or three days, and often within a few hours of the operation.

In explanation of this Sir James Paget offers two alternative suggestions.

'Either,' he says, 'the condition induced in a patient, by a surgical operation, is one that gives a peculiar liability to the reception of an epidemic or contagious morbid poison, and any one of these, being imbibed immediately after the operation, produces its specific effect in much less than the usual period of incubation: or else those who suffer with scarlatina within a few days after

* In the great majority of the cases the rash was the earliest symptom noticed, and the periods referred to indicate the time at which this was first observed. Occasionally, however, premonitory symptoms were previously noticed.

† This period, it will afterwards be shown, is probably less than the mean time of incubation in ordinary cases of scarlet fever uncomplicated with wounds, and the shortness of this period is much insisted on by writers who have noticed the phenomena in question, as being characteristic of scarlet fever occurring under these circumstances.

operations, had previously imbibed the poison, but would not have manifested its effects so soon, if at all, unless their health had been exhausted or disturbed.*

There seem to me to be difficulties in the way of accepting either of these hypotheses as an explanation of all the cases. If operations cause a peculiar state of system, conferring a predisposition to the reception of morbid poisons, that predisposition should be greatest when the peculiar state induced by the operation is most marked. As the effect on the system of a severe operation is usually more marked than that of a slight one, we should naturally expect to find that the cases in question occurred after the major, rather than the minor, operations of surgery; but an examination of the table shows a very large proportion of cases which might be almost called trivial. With our present lights, it is not easy to suppose that the division of webbed fingers, or of a tendon subcutaneously, can produce a state of system more predisposed to infection than that which existed beforehand, though we might be quite prepared to admit this in the case of a severer operation. Still it is far from impossible that, even after the infliction of what we call the most trivial wound, there may supervene some peculiar state of system unrecognisable with our present knowledge, but which may nevertheless profoundly modify the constitution. There is, in truth, no wound so small which may not be the source of the very gravest events, as the practice of surgery has too often testified. As far as an isolated case is of any value, that reported by Mr. Lea, which has already been quoted, lends support to the view that the liability to infection is dependent on a peculiar state of system; for in that instance the patient, who had undergone an operation, was the only adult who caught scarlet fever in an epidemic which affected many children.

On the other hand, the acceptance of the hypothesis, that the poison was imbibed previous to the operation, involves the necessity of believing that the infection invariably took place within a very limited period beforehand, unless, as Sir James Paget suggests, the poison

* Op. cit.

might have been lying for some time latent, and only made itself manifest in consequence of the disturbance of the system. There is, however, just as strong an antecedent improbability that infection should always have taken place within a limited period before the operation, as that the symptoms of fever should always appear within a limited period after, supposing operation and fever to have no relation to one another. Moreover, if the poison were imbibed into the system beforehand, it would be natural to suppose that in some cases it would have given evidence of its presence by the appearance of premonitory febrile symptoms before the operation; but this seems not to be the case; and Mr. Marsh states* that it is the invariable custom in Great Ormond-street not to operate if there is any deviation from the normal temperature.

In striking opposition to the theory that the poison can be imbibed some indefinite period previously, and remain a long time latent, until the operation, as it were, starts it into activity, we have Dr. Murchison's† investigations as to the incubation period of scarlet fever. This authority, after a careful investigation of seventy-five cases in which the maximum limit of the latent period could be fixed, finds that this, which has been variously stated as being from two days to one month, is shorter and less variable than has been usually supposed. In none of the seventy-five cases did the incubation period exceed six days.

In 73	it could not have exceeded			5 days.
„ 54	„	„	„	4 „
„ 20	„	„	„	3 „
„ 16	„	„	„	2 „
„ 3	„	„	„	24 hours.

The longest period in which the precise moment of infection could be fixed was four and a half days. These facts 'lend no support,' says Dr. Murchison, 'to the statement that scarlet fever differs from all the other exanthemata in the great variation of its incubative stage.' I take it we shall not be far wrong if we assume four to five days as being the mean incubation period of ordinary

* Paget's *Clinical Lectures*, note xvii.

† *Transactions of the Clinical Society*, vol. xi.

cases of scarlet fever, whilst fully recognising the fact that it is very frequently much shorter, and may possibly, though apparently rarely, be a little longer.

The only instance in the preceding table in which the exact time of infection can be probably stated with accuracy is the one already alluded to, where it seems certain that the patient was infected at the time of the operation by the surgeon.

In another case it is almost certain that infection must have taken place within a period of three hours, either just before or just after the operation, from a boy in the next bed. The latter had been admitted into the ward on the day that the former was to be operated on, and his symptoms proving to be scarlet fever, he was removed from the ward, after being in it no more than three hours. It was probably only during this time, therefore, that the liability to infection existed, as there had been no other case in the ward for some time.

In a few instances it seems clear that infection had taken place before admission, as in those cases in which it was clearly shown that scarlet fever existed in the families of the patients at home.

Whilst, therefore, on theoretical grounds, neither of Sir James Paget's hypotheses seems to me to account for all the cases, I can offer no better explanation of the connection that undoubtedly does exist between the operation and the fever. It is, moreover, extremely probable that the explanation may not in all cases be the same, that each, in fact, of Sir James Paget's suggestions may at times be the right one.

Since the common factor in all the cases is the presence of a wound, it is a tempting hypothesis to suppose that the poison of scarlet fever may, like some other poisons, enter by the wound. It is admitted that the poison of scarlet fever is inoculable,* and vaccination itself affords abundant proof of the ease with which a specific poison may be introduced into the system by an almost inappreciable wound.

* For evidence in support of this, see lecture by Dr. Murchison, *Lancet*, 1864, vol. ii. p. 175.

But it must be confessed that there is no evidence whatever in support of such a view. On the contrary, what little evidence we have on the subject seems to me to point to the conclusion that the wound is not in any way the channel of infection. In not a few of the operation cases in question, in which the rash and febrile symptoms supervened, the wound itself is noted to have gone on uninterruptedly well, which, remarkable in any case of acute fever, would be, I think, still more so, if the wound were the way of entrance of the poison. And again, the symptoms in question are found to occur in cases which have been throughout treated with the strictest antiseptic precautions; and we have no grounds for supposing that by such a method poisons of one sort can be excluded, while others find ready admittance.

To sum up our very scanty knowledge of the subject: though the frequent occurrence of the rash and fever within a short and tolerably uniform period after an operation betokens that some definite relation exists between the operation and the symptoms, yet we are not yet in a position to define the precise nature of that relation.

In those cases in which, from the surroundings, infection seems most likely to have taken place beforehand, the shock even of a slight operation may have been sufficient to start into premature activity changes which, in the absence of an operation, would have manifested themselves less suddenly and less irregularly. In others in which no prior infection can be traced, the hypothesis that some peculiar disposition to infection is caused by the state induced by the operation seems the only possible, and not improbable, explanation.

Variations and Abnormalities.

A great deal of the doubt as to the true nature of the cases we have been describing has been due to a fact we have already incidentally noticed, viz. that the scarlet fever, as it occurs after wounds, often departs from the normal type of this disease. Thus Sir James Paget* remarks that 'it undergoes certain modifications, espe-

* Op. cit.

cially in the period of incubation, which is much shortened,' and mentions other variations in the usual course of scarlet fever. One of his cases recorded is a marked example of such a departure from the normal course. M. Trélat* also points out certain slight variations; and others who have approached the subject. In fact, we may take it for granted that these modifications must have been particularly noticeable, or there would not have been so much hesitation to call the disease scarlet fever, which it appears undoubtedly to be.

The number of cases at our disposal is as yet too small to enable us to formulate, with much exactitude, what the variations are; but still I think I shall be able to show that there exists a certain amount of uniformity in the departure from the normal type. And first as to the period of incubation: Sir James Paget and others have been struck by the shortened period of incubation in the cases that came under his notice; and on this point Dr. Bristowe states:† 'In puerperal cases, and probably also in persons suffering from large wounds, the period of latency seems generally of short duration.' But of course the great difficulty in reckoning this is to fix the exact time of infection. If we might assume that infection took place either at the time of the operation, or just before or afterwards, then the larger number of cases in the preceding table would be a striking confirmation of Sir James Paget's opinion. For, reckoning only those cases in which the dates are accurately given, we have seen that the mean period elapsing between the operation and the outbreak of the fever is as nearly as possible two days; and as this period includes also the premonitory febrile symptoms where they exist, the stage of incubation is correspondingly less. This, it will be seen, is less by one half than the probable mean period of incubation of ordinary cases uncomplicated by wounds, as shown by the investigations of Dr. Murchison before alluded to.

In the face of the difficulty, then, in fixing the actual time of infection, which attends these as well as all other

* Loc. cit.

† *Theory and Practice of Medicine*, p. 157.

similar cases, it is therefore not easy to establish absolutely even the point that the incubation period is shortened; but it is worthy of note that, in the only two cases in which the actual time of infection could be proved with some approach to certainty, the incubation stage corresponded exactly with the mean period above given, viz. two days.

The premonitory febrile symptoms, which usually precede the rash in ordinary scarlet-fever cases, is of much shorter duration, or often not marked at all, the rash being, in nearly every instance, the first symptom of the fever noticed.

Whatever may be the colour or description of the rash, it does not usually, in normal cases, attack all parts of the body simultaneously, but appears in successive crops appearing first on the face, neck, and upper extremities, then extending to the trunk and lower extremities. In the cases in question, according to Sir James Paget, it often appears at once all over the body, or on the limbs more fully than on the face and chest, or otherwise irregularly.

A reappearance of the rash some days after it had once disappeared took place in one of Sir James Paget's cases already quoted. In one case (No. 60) the rash was absent altogether, and in another it is described as being more of the nature of a duskiness of skin (No. 5). But in a disease like scarlet fever, in which the features of the rash may vary to almost any extent, it is not safe to fix upon any variation of it, which is especially characteristic of the type of the disease as it exists in the traumatic state; nor is there, I think, any evidence which would warrant our doing so.

Direct mention of sore-throat is very seldom made; and although I would not on that account assume that the symptom is usually absent altogether, I think we may affirm that it is not frequently severe in the class of cases under consideration. I am inclined to think that, in this peculiarity, we have one of the most constant deviations

from the normal type of scarlet fever. Trélat* also expresses the same opinion; and, as will be shortly seen, an interesting parallel in this respect appears in the disease when it occurs during the puerperal state.

With regard to other variations, there is nothing very definite to be gleaned from the limited number of cases at command. Trélat merely states that one of his cases was marked by peculiarities in the febrile cycle and manner of desquamation; and Sir James Paget and others have all remarked upon the various irregularities that have been seen to occur.

The Age of the Patients affected.

The fact that I have been able to collect as many cases from one children's hospital as from all other sources together points very distinctly to the susceptibility of young subjects to scarlet fever under these circumstances, as well as in all others; and I think it is permissible to see in this an additional argument in support of the theory, that we have to deal here with true scarlet fever.

Mortality.

Among the sixty-three cases given in the table there were seven deaths, or about eleven per cent, which seems a rate about the same as we might expect to find in the same number of ordinary cases uncomplicated with wounds; though, from the fact that the ordinary dangers of scarlet fever have, in the one case, the risks attaching to the presence of a wound, we might, not unnaturally, have expected a higher rate of mortality.

Condition of the Wound.

As regards the behaviour of the wound during the fever, we should, I think, expect to find that the healing of wounds during any acute febrile attack would be materially interfered with; but, as has been already stated, this does not appear to be uniformly the case. In a certain number of cases, especially those of hare-lip, it is stated

* Op. cit.

that the operation was wholly unsuccessful; in others, that it was only partially so; while in others it is remarked that the healing of the wound progressed uninterruptedly well.*

In one or two instances the eruption was most marked in the neighbourhood of the wound; and this has been observed also in a case of measles and of smallpox occurring in persons who had recently been subjected to operation,† the behaviour of the eruption in these cases having some resemblance to erysipelas; but, in general, it seems not to have been more pronounced in the vicinity of the wound than elsewhere.

An interesting analogy with scarlet fever occurring after wounds, as well as, what appears to me, a striking confirmation of the views advocated in the preceding pages, is afforded by the same disease as it occurs in the puerperal state.

Olshausen, in an exhaustive paper in the *Archiv für Gynäcologie, Band IX.*, after an examination of 143 well-authenticated cases, shows that where an exanthem in lying-in women appears truly like a scarlet-fever eruption, it is right to consider it as true scarlet fever, and not as a form of so-called puerperal fever, as has been stated, provided that the accompanying appearances and course are not analogous to puerperal septicæmia or pyæmia.

He shows that out of the above number, in 97, or 68 per cent, the rash appeared within three days of delivery, and not once did it occur after the eighth day. He further points out that, besides this constant onset of the symptoms within a week, and mostly within three days, there are certain peculiarities in the course of the disease, among which he particularises the usual appear-

* I have recently heard of a case not included in the table, in which the healing of a cleft palate which had been united by operation went on uninterruptedly well during a similar attack of intercurrent scarlet fever. This is remarkable when we think of the possible local affection of the throat, and the difficulty there often is with the union of the wound even in the most favourable cases.

† *Vide* paper, by Dr. Braxton Hicks, on Puerperal Diseases, *Transact. Obstet. Soc.* vol. xii.

ance of the rash all over the body at once, the absence generally of any premonitory febrile symptoms, and the rarity with which the throat is affected.

The almost exact resemblance between puerperal scarlet fever and the same disease as it occurs in the traumatic state, as regards the time of onset and other peculiarities, is thus at once apparent; and I venture to think that such close analogies point to a similar relation between the fever and the operation on the one hand, and the fever and the delivery on the other.

There is, I think, a very close resemblance between the physiological state of a woman who has just been delivered and that of a person who has recently undergone an operation of a certain gravity.* Each event is usually followed by a certain amount of febrile reaction, possibly very slight, but often well marked. In each there is a disturbance of the vascular system, due to sudden alteration or distribution of the amount of blood in circulation; and often a similar state of exhaustion from loss of blood. In both frequently, a highly-strung state of the nervous system, due to hopes, fears, or anxiety; and, above all, there is in each case the existence of a wounded surface through which, or from which, certain poisons can be, and often are, most undoubtedly absorbed into the system, there to bring about changes identical in each case. The weak point of this analogy, if it may be made at all on these grounds, lies obviously in this, viz. that the comparison between the two states, puerperal and traumatic, can only be made in the case of the severer wounds, in which alone the above conditions obtain; while it fails entirely in the case of slight punctures and incisions, which, nevertheless, are perhaps the most liable to be followed by the symptoms in question.

If, however, we may admit that there is this analogy between the two conditions, we may certainly, I think, deduce therefrom some support to the view here advocated, that we have to deal with genuine scarlet fever.

From the extreme insusceptibility of women during

* See also Professor Simpson on the analogy between puerperal and surgical fever, *Edinburgh Monthly Journal*, third series, vol. ii. p. 414.

pregnancy to scarlet-fever infection, Olshausen endeavours to show that, in his cases, the poison had been received some time previously, and had lain latent till after delivery, when the state of body induced by that event allowed the poison to suddenly display itself. We have already shown, from Dr. Murchison's investigations, that this is not probable; but this is not the place to dwell further upon the point.

In one important point only does this puerperal scarlet fever seem to differ in character from the traumatic, viz. in its extreme fatality. Out of 143 cases of scarlet fever occurring after confinement, no less than 64, or 48 per cent, died, which contrasts remarkably with the comparatively small mortality after operations, though the numbers are in each case insufficient to serve for trustworthy statistics.

I venture, therefore, to assert, both from analogy and from the cases here recorded, that *the rash and febrile symptoms which occur frequently as the immediate sequel of an operation are often those of scarlet fever; that the fever is, in some way as yet undetermined, dependent on the presence of the wound; and that when scarlet fever occurs under these circumstances, it undergoes certain deviations from the normal type of this disease.*

Anticipating now the question whether scarlet fever stands alone amongst the eruptive fevers in its proneness to attack the subjects of recent wounds, I may remark that, while inquiring after scarlet fever, I fully kept in view the possibility that other fevers might similarly occur; but I have not been able to find recorded more than a very few isolated cases where an eruptive fever, other than scarlet fever, supervened so closely on an operation as to seem in any way dependent on it.

One of these was a case mentioned by Sir James Paget.* A boy, on whom lithotomy had been performed, became very ill three days afterwards, and soon a vivid red eruption appeared, which was first developed and most intense at the seat of the wound. This was

* Address on surgery, Brit. Med. Ass., 1862.

measles. In another case smallpox supervened after a bruise, and was most intense over the injured part. On this point Mr. Marsh* also gives his opinion that scarlet fever is the only one of the exanthemata which has this peculiarity.

With a view of ascertaining whether a more extended search might not reveal the existence of traumatic measles as well as scarlet fever, I have very carefully examined the records of the Children's Hospital for over twenty years. Though, during that period, there were eighty-one cases of measles intercurrent in patients admitted for other surgical diseases, in scarcely a single instance did the measles occur so soon after an operation as even to suggest a relation to that event. Measles of course, and, for that matter, chicken-pox and other infectious diseases, did occur in the subjects of operations, as well as in other children, but usually at long, and always at very variable, periods afterwards; there was no series of cases at all comparable to the table of cases of scarlet fever here given.

We may say then that, as far as we know at present, scarlet fever stands alone amongst the eruptive fevers in its liability to attack the subjects of recent wounds.

Two papers on the present subject have recently appeared in the *Guy's Hospital Reports* for 1879, one by Mr. Howse, the other by Dr. Goodhart;† and in each a number of cases is related which bear upon the point. With regard to the increased liability to scarlet fever by patients recently operated on, both these gentlemen have arrived at conclusions similar to those here advanced. But they have gone still further, and would extend the liability, Mr. Howse to *all* surgical maladies involving discharges of any kind, and Dr. Goodhart not only to surgical diseases, but to *all* cases, whether medical or surgical, which involve the existence of a local inflammation.

The latter advances the view: 'That the condition induced by a surgical operation is one that gives a pecu-

* Paget's *Clinical Lectures*, note xvii.

† I must here express my thanks to Dr. Goodhart for his great courtesy in sending me the proof-sheets of his paper.

liar liability to the reception of an epidemic or contagious morbid poison is quite borne out by the facts; but to limit the liability to conditions induced by surgical operation leaves out of account altogether a certain number of cases which are, in themselves, highly suggestive. What seems to me to be probable, and what is, moreover, quite in accord with the doctrines concerning these febrile diseases in vogue at the present day, is, that the presence of any local inflammation in any part furnishes a bed for the cultivation of the poison, and that this is probably imbibed by the ordinary channels of infection, and not through the wound. The fact of an operation I conceive to play quite a secondary, though an important, part in the production of the disease. The inflammatory process is the essential, and an operation would supply that as well, though not necessarily better than a spinal abscess or some local cellulitis, &c. But in proportion, as operations establish severe local inflammation and fever, so, I apprehend, do they render the "cultivation" of any epidemic poison more certain by increasing the forcing action of the hotbed which they thus furnish.'

Further, Dr. Goodhart claims for measles a similar proneness to attack such cases as for scarlet fever.

I have already shown that the same predisposition to measles as to scarlet fever, as far as I have been able to ascertain, does not exist in the subjects of recent wounds; and I have since endeavoured to substantiate Dr. Goodhart's theory as to the extra liability of those maladies which involve some local inflammation, but am unable to do so. Omitting consideration of the surgical cases—for almost all surgical diseases are cases in which there is local inflammation—I find, on careful examination into the nature of the purely medical cases, where perhaps we may be better able to draw a distinction between inflammatory and non-inflammatory diseases, that the latter class are just as liable to the disease as the former. There would seem to be, in fact, no special predisposition in any class of cases except the subjects of recent wounds. It is more probable that the presence of an open wound, though not a recent one, may confer some degree of extra liability over those

with a whole skin; but the records of surgical cases did not enable me to distinguish sufficiently between those in which this state of things existed and those in which it did not. In many cases of joint-disease, for instance, it is not stated whether abscesses or sinuses existed or not, and I am unable at present to come to a definite conclusion on this point.

From all the cases that have now been brought forward, and from the evidence of others, I see good grounds for accepting the fact that the subjects of recent operations are in some way liable to scarlet fever, and perhaps it may yet be shown to the other exanthemata; but the difficulty still remains to explain satisfactorily why this is so. We shall all be ready to admit, I think, the great predisposition to any infectious fever or disease of many kinds afforded by fatigue, exhaustion, or debility, whether induced by an operation or otherwise; but the difficulty lies in supposing that these or any analogous conditions can be brought about by an operation that involves no more than the division of a tendon or the paring of a hare-lip, for the same liability exists in these as in the more serious cases.

The preceding arguments have been chiefly directed to show that scarlet fever may be looked upon as a not unfrequent sequel to an operation or wound, but it will be remembered that it has also been set forth more than once that the rash of scarlet fever is not the only eruption occurring under these circumstances.

Had there been observed only such cases as those recorded in the preceding section, it is, I think, improbable that so much difficulty as to diagnosis would have arisen; for after all, in spite of various anomalies, the balance of evidence must, in the great majority of cases, have pointed to scarlet fever. There was, besides the highly characteristic rash, usually high fever, sometimes sore-throat; and the additional fact that epidemics were prevailing at the time left little doubt as to the true nature of the symptoms in question. The chief difficulty, I apprehend, was to arrive at a reasonable conclusion why these

wounded people should exhibit such a predisposition to contract the disease.

But under exactly similar circumstances there would every now and then occur a case in which, apart from the rash (which, in truth, was marked by all the characteristics of the scarlet-fever eruption), there was scarcely another symptom typical of that disease. Perhaps the temperature might be somewhat elevated, but often there was scarcely any rise; and frequently both rash and febrile symptoms, when these latter existed, passed away in a few hours, leaving the patient none the worse for the attack. The difficulty of the whole matter was much increased by the fact that desquamation, more or less complete, followed in the one case as in the other. No source of infection could be traced, nor was any imparted to others, though the cases were often in contact with those who had not previously had scarlet fever. In spite of their close superficial resemblance, it was impossible to believe that they could be of the same nature. Evanescent rashes of such a character, it was noticed, were especially liable to follow burns and scalds, and several such instances will be given here, but they were observed to follow injuries of other kinds as well. From the very transient character of the symptoms it was almost impossible to class them with the better authenticated cases of scarlet fever; though the circumstances that both kinds of rash occurred under similar conditions—that one as well as the other might be attended with febrile symptoms, and that both were alike followed by desquamation—made a differential diagnosis very difficult, in fact almost impossible.

This difficulty of course was confined to those cases of simple traumatic rash, if we may call them thus, where it is scarlatiniform in character; but though most commonly of this kind, they are not always so, and I think considerable force is given to the argument in favour of the non-scarlatinal origin of many of these rashes by this fact. If eruptions of other types, of urticaria, papules, and vesicles, for instance, are found to occur in similar cases, there is no reason whatever why a simple erythema unconnected with scarlatina should not also exist. Again,

though it is so exceedingly difficult to exclude the possibility of infection, yet the great improbability of that occurrence in some instances rendered that hypothesis almost untenable. It is thought that a perusal of the following cases will permit us to look upon simple eruptions of the skin unconnected with scarlet fever or any other infectious malady as a well-established possible sequel of a wound, injury, or operation.

We have already alluded to the mention made by Civiale* of the rashes that seem to answer to this description, and, in speaking of a discussion at the Pathological Society,† we have remarked that many of the cases there brought forward were clearly not of scarlatinal origin, being rather of the nature of simple erythema or urticaria. For instance, Dr. Graily Hewitt said he had observed an eruption of urticaria after the removal of an excrescence from the female urethra, and stated that this is mentioned by Scanzoni as occurring not unfrequently after operations on the female genitals.

Dr. Broadbent said he had observed three cases of vivid eruption after operations, which was not that of scarlatina; there was slight desquamation, but no general febrile symptoms and no sequelæ.

Dr. Crisp stated that he had many years before operated on a boy for phimosis, and in a short time after the body was covered with a scarlet erysipelas-like rash, and the patient died.

Mr. Spencer Wells remarked that eruptions were by no means uncommon after wounds, injuries, or surgical operations. He had seen a bright red rash, like that of scarlet fever, cover the whole body within a quarter of an hour after perchloride of iron had been applied to a cauliflower excrescence of the uterus, and even the application of caustic to a uterus. He knew a patient who never had the speculum passed without urticaria following.

Mr. Callender had noticed eruptions after operations, and instanced one case in which a scarlatina eruption came out twenty-four hours afterwards.

* Op. cit.

† *British Medical Journal*, 1863, vol. ii. p. 679.

Mr. Henry Lee had seen three cases of eruption after operations; in one, twenty-four hours after phimosis, a livid blush appeared, and the child died.*

In a letter to the *British Medical Journal*,† Dr. Wilks stated that he had often been called in at Guy's Hospital to give an opinion about a rash after operations, which generally resembled scarlet fever; and he distinguished between those which occur early, and the erythematous and roseolous eruptions which occur in cases of pyæmia and blood-poisoning.

And more recently Dr. Cheadle‡ has admitted that patients with open wounds from accidents or operations were, on the one hand, very susceptible of scarlet fever, and on the other that a simple non-contagious rash might occur under similar circumstances; and, after discussing the symptoms, he failed to discover any reliable sign whereby the one condition might be invariably distinguished from the other. To this communication further reference will be made.

Analogous rashes have also been observed in conditions other than those of surgical interference, which, nevertheless, involve some injury or irritation of sensitive tissues. Thus M. Litten§ reports a case of gallstone colic followed by jaundice, in which an outbreak of urticaria, on two occasions, accompanied the passage of a gallstone; and in another case an attack of urticaria was observed to coincide with the passage of tænia proglottides.

These brief notices serve to show that the phenomena in question had been very frequently noticed by various surgeons and physicians, though the views held concerning them were various and indefinite. I now append a few others in which I have been able to obtain more complete details. These have either been recorded by

* This instance, and the one quoted by Dr. Crisp, were in all probability cases of scarlet fever, and are only mentioned here in the absence of sufficient details to verify them. It will be seen later that circumcision is an operation extremely liable to be followed both by scarlet fever and the simple rash.

† 1864, vol. ii. p. 428.

‡ *British Medical Journal*, 1879, vol. i. p. 75.

§ *Centralblatt*, 1879, No. 23; reported also in *American Archives of Dermatology*, vol. vi. No. 1.

others, or have come under my own immediate observation. I am fully aware that the number is far too small, and the details in many cases insufficient to enable us to establish much that is conclusive; but they are all that I have been able to collect after a considerable search, and I hope they are not altogether valueless. It must be remembered that the subject is comparatively an uninvestigated one, and that future observations will probably reveal many more such cases.

CASE I. *Papular Eruption twenty-four hours after Opening an Abscess.*[*]

Madame G., seamstress, admitted March 12th, 1870, with a superficial abscess, of the size of a walnut, in the middle line of the neck. Fever was present, also slight rigors, followed by extreme heat, headache, loss of appetite, and sleeplessness. The abscess was opened on the 14th March. On the 15th there appeared on the buttocks a crop of small papules (*boutons*), which were attended with uncomfortable itching. Next day the eruption spread to the knees, arms, and shoulders. On the 17th the eruption became general, occupying the dorsal surface of the arms and forearms, shoulders, back, buttocks, knees, and the dorsal surface of the feet. There were some papules on the internal surface of the legs and thighs. None on the face, breast, and abdomen. The papules were of the size of a grain of millet-seed, and scarcely coloured; under pressure they disappeared. They were disseminated, or confluent in the form of larger papules of considerable size, separated from one another by tracts of healthy skin. Some of them were surmounted by a small blackish crust, the result of scratching. The itching was increased by heat rendering sleep impossible. There had been nothing analogous in the antecedent condition of the patient, who had hitherto enjoyed perfect health. This eruption lasted ten days, and then disappeared slowly; the abscess healed, the general health became reëstablished, and the patient went out entirely recovered on the 29th March.

CASE II. *Papular Erythema six days after the Puncture of a Cyst preceded by Sore-throat and Fever.*[†]

Madame S., æt. 25, laundress, admitted March 21st, 1870. The patient was of a rather delicate constitution; she had a dental cyst a little behind the right canine fossa of ten months' growth, due to caries of a molar tooth. The cyst was punctured on the 27th March, from the inside of the mouth, resulting in the issue of serous fluid mixed with blood. The next day she left the hospital against advice, and on the following day she was seized with headache, nausea, shivering, and

[*] Tremblay, *Gazette Hebdomadaire*, Sept. 2d, 1870 (No. 35), p. 519; 'Eruptions Cutanées à la suite des Opérations Chirurgicales.'

[†] Tremblay, loc. cit.

sore-throat, so that she again sought admission on April 1st, when, in addition to the above symptoms, the right cheek was more swollen. On April 1st these symptoms had subsided somewhat; but there were observed on the anterior surface of the wrists, on the dorsal surface of the hands and fingers, and on the sides of the neck patches (*taches*) of a vivid red colour. These were disseminated or confluent, and separated by tracts of normal skin. They were slightly elevated, disappeared under pressure, and caused neither pain nor itching. The patient had never previously had any eruption of the skin. This rash lasted two days, and was followed by slight desquamation.

CASE III. *Urticaria within three hours of an Operation for Phimosis.*°

G. P. was operated on for congenital phimosis at 9 A.M. Towards noon of the same day the patient was covered with a well-marked eruption of urticaria, which disappeared twenty-four hours afterwards, and in no way interfered with recovery.

CASE IV. *Scarlet Rash following a Scalp-wound; subsequent Desquamation.*†

On Saturday, August 27th, a boy, æt. 10, fell, and struck the back of his head, causing a wound about an inch long. This was closed with strapping, and he seemed to be doing well till the sixth day after the accident. He was then found moaning in bed with much pain and tenderness at the back of the neck. The cervical glands were enlarged, and the lymphatics, leading to them from the wound, inflamed. On the next day he was feverish, and covered with a scarlet rash, but there was no sore-throat. On the wound being opened, some offensive pus escaped. The rash lasted a few days, and was followed by complete desquamation of the skin. The boy gradually recovered; but on September 24th he again became feverish, and complained of great pain in the left foot, with inability to stand. He was pale and feeble, with a quick pulse, and the skin was rough and peeling. The glands on the left side of the neck were swollen and tender. The left foot was painful, but was not swollen. The boy was believed to have previously had scarlet fever. There was no case of the disease in the village at the time of his illness, nor was any one in the house affected with similar symptoms.‡

CASE V. *Scarlet Rash after a Wound of the Thumb; Desquamation.* §

On November 1st Master N. was observed (at school) with a rash. There had been three cases of scarlet fever during the term, the last

° Dr. G. Puel, *Gazette Hebdomadaire*, Sept. 9th, 1870 (No. 36).

† Mr. George May jun. *British Med. Journal*, 1864, vol. ii. p. 248.

‡ This case may possibly have been one of scarlet fever, and as such it is quoted in Ziemssen's *Cyclopædia*, vol. ii. p. 184; but in a subsequent communication, *British Med. Journal*, 1878, vol. ii. p. 919, Mr. May denies that this was so, and is of opinion that these rashes should be more properly considered as septicæmic.

§ George May jun., *British Med. Journal*, vol. ii. 1878, p. 919.

having been removed to a detached house one month previously. The boy looked ill, and had a slight headache. There was a scarlet rash resembling that of scarlet fever, chiefly on the body, but also to a less extent on the limbs. The fauces were red, and the tongue moist and furred. The pulse was under 80, and the temperature never rose above 100°. The case was isolated, but not removed to the building for infectious cases. It was discovered that there was a slight wound on the thumb, with tenderness extending from it to the wrist. On the 27th desquamation commenced freely on the affected arm, and disclosed a broad band of inflamed lymphatics. Subsequently the peeling extended over the whole body.

CASE VI. *Scarlet Rash after Division of Tibia; Desquamation.*[*]

On November 15th the right tibia was divided in a child, and on the 22d the left. On the 27th a scarlet rash appeared with enlargement of the inguinal glands; the child was not removed to the ward for infectious cases. On December 1st the right leg, the wound of which had suppurated, desquamated freely, while the other did not, but peeling had commenced generally over the trunk. There were twelve children in contact with this case, but none suffered from similar symptoms.

There can, I think, be very little doubt but that Mr. May is perfectly right in considering the two last cases, at least, as non-scarlatinal. In No. 5 the very low pulse and temperature, and in No. 6 the absence of all further infection, though so many children were subsequently brought in contact, almost certainly precluded scarlet fever. In each, it will be observed, there was complete desquamation.

CASE VII.[†]

A little girl, æt. 13, fell, bruising her elbow; she became depressed, and went to bed. The next day unmistakable symptoms of scarlet fever made their appearance.

CASE VIII.

On Saturday, November 6th, a little boy of two scalded his leg. On the following Wednesday the child was feverish and poorly, with a distinct scarlet rash and other usual symptoms of scarlet fever.

[*] George May, loc. cit.

[†] Mr. G. R. Moore, *British Med. Journal*, 1878, vol. ii. p. 859. This and the two succeeding cases were communicated by the writer as really cases of true scarlatina following injuries; and indeed they may have been so; but as so few particulars are given, and as the diagnosis in a most difficult matter rests almost entirely on the assertion of the writer, it is thought more prudent to include them in this section rather than the former, treating of scarlatina. Should their presence here be objected to, they should, of course, find a place in the preceding section.

CASE IX.

On Monday, November 4th, a boy of five fell on some hot baking-tins and burnt his nates, scrotum, and thighs. On the following day a rash appeared all over his body similar to that of scarlatina. There were sore-throat and great feverishness. On the fifth day after its appearance the rash was fading, but there was still sore-throat.

CASE X. *Scarlet Rash accompanying the Formation of a deep-seated Abscess due to Injury, but without external Wound.*[*]

Dr. Braxton Hicks communicates the case of his son, who whilst at school became feverish, and on the following day there was delirium, and an eruption like that of scarlet fever made its appearance all over him. The throat was somewhat flushed. After the delirium, which lasted three days, had subsided, it was ascertained that there was pain over the right buttock, which was more swollen than the other. This became the seat of a large deep-seated abscess, which required to be opened. The rash, nearly universal from the first, lasted three days, and was not followed by desquamation. The cause of the abscess was discovered to be a sudden strain inflicted on the muscles and fasciæ by violence done him by a schoolfellow.

CASE XI. *Scarlet Rash accompanying the Formation of an Abscess, the Result of Injury without external Waund.*†

Dr. Cheadle communicates the case of one of his children, who had an abscess of the thigh caused by an injury, but there was no external wound. At the commencement of the suppurative process a general scarlet rash appeared. No infection of scarlet fever could be discovered, and the child did not infect others. This eruption disappeared in twenty-four hours, and was not followed by desquamation or other sequelæ.

In the two previous cases it will be noticed that there was no external wound when the rash appeared.

CASE XII. *Red Rash accompanying suppurating Glands.*‡

A child, æt. 5, had inflammation of the lymphatic glands, which suppurated. At the time the abscess was fully formed, a red punctiform rash appeared all over the body 'paler than that of scarlet fever.' The temperature never rose above 99°, and there was no sore-throat or desquamation. No source of infection from scarlet fever could be ascertained.

* Dr. B. Hicks, *British Med. Journal*, 1879, vol. i. p. 11.
† Dr. Cheadle, *British Med. Journal*, 1879, vol. i. p. 75.
‡ Mr. J. A. Lea, *British Med. Journal*, 1879, vol. i. p. 227.

CASE XIII. *Scarlet Rash after Burn from Explosion of Gunpowder.**

Private Chapman, æt. 24, who had been three years in India, was blown up at Ali Musjid by the accidental explosion of some loose gunpowder, on December 21st, 1878. He was severely burnt on the left hip, on the inside of the thigh, and on the arms and face. Next day he was sent to the Base Hospital at Peshawur. On the 25th there was considerable constitutional disturbance, and a bright scarlet rash on the abdomen, which spread over the whole body. This became next day very vivid, 'like a boiled lobster.' It was pronounced to be scarlet fever by the medical officers, and the man was isolated. The eruption continued for five days, then gradually disappeared. The temperature became normal after the eruption appeared (the highest point having been 101° at the onset of the fever). The tongue was slightly furred, but never became red, there was no sore-throat or enlargement of the tonsils. No scarlet fever existed in the camp at the time. The cuticle subsequently desquamated over the whole body, even on the palms and soles. He was discharged, recovered, on the 3d February.

This is a most interesting case. In this country the fact that there was no ascertainable source of infection by no means precludes the possibility of its having taken place. For, the disease being always more or less among us, there are innumerable means of transmission. In this instance, however, not only was there no scarlet fever in the camp, but this disease is of the very extremest rarity in India. According to Dr. Morehead† and the Reports of the Army Medical Department, it is absent.‡

It is, therefore, very difficult to suppose that this could possibly have been a case of scarlet fever. In spite of the opinion of the medical officers who pronounced upon it, and its manifestly close resemblance to that disease, we may, I think, rightly consider it as a simple traumatic erythema, such as we have noticed are peculiarly apt to follow burns.

CASE XIV. *Rose Rash following Burn.*§

E. B., f., æt. 3, was admitted to St. George's Hospital on January 2d, 1877, with a slight superficial burn of the right side and hip. The

* Surgeon-Major Ffolliott, *British Medical Journal*, 1879, vol. ii. p. 505.

† Quoted by Dr. Murchison, *Lancet*, 1864, vol. i. p. 695.

‡ See also communication by Sir Joseph Fayrer to Dr. Goodhart, *Guy's Hospital Reports*, 1879, p. 308: 'Scarlatina is so rare in India that many say it is not here at all. This I do not believe; but I know that the soil must be most uncongenial, as it is so very seldom seen.'

§ Cases XIII. to XVII. inclusive occurred under my own observation, or in the practice of my colleagues at St. George's Hospital.

skin generally was only reddened, but here and there were a few vesications. She progressed perfectly well until the 4th, when she was hot, flushed, and feverish; temperature 102°; tongue white and moist. On the following day (three days after the accident) there was a diffused roseolar eruption over the chest; papillæ of tongue red and prominent; pulse 148; temperature 100·6°. The next day the eruption had completely disappeared, the skin was dry and harsh, but the febrile symptoms had quite subsided. On the 8th she was taken away by her parents, to all appearances doing well.

CASE XV. *Rose Rash following Burn; Desquamation.*

L. D., f., æt. 6, was admitted on May 2d, 1879, with a burn of the right shoulder and arm, the result of her clothes having caught fire. There was much pain, but no collapse. She progressed well until the 10th, when she became covered with a vivid mottled rose-coloured rash. There were no febrile symptoms nor any sore-throat. By the 13th the eruption had disappeared, and slight desquamation had commenced.

CASE XVI. *Rose Rash following Division of Tendons.*

On June 16th, 1879, the tendons of the tibialis anticus were divided in a youth of 16. Two hours after the operation there was severe shivering, and a restless night followed. Next morning he was hot and flushed in the face, with a hot skin (temperature 101°). Tongue thickly coated with white fur, and showing a few prominent papillæ. Throat somewhat congested. The chest and limbs were covered with a mottled rose-coloured rash, disappearing on pressure. No pain of any kind was complained of, but there was excessive thirst. On the 18th there was less flushing of the features, and the eruption was fading. This latter symptom varied much in intensity from time to time, being sometimes hardly perceptible, at others very vivid. The tongue still remained thickly coated, excepting at the tip, where it was clean and glazed. Temperature 101°, pulse 126, soft. No sore-throat. On the following day (19th) the rash had entirely disappeared, but the tongue remained coated, and the pulse and temperature were respectively 120 and 100°. The urine was acid, and contained no albumen. There was some slight redness and great tenderness about the wound on the left foot, and the whole dorsum was somewhat swollen and œdematous. By the 23d all the untoward symptoms had quite subsided. The pulse and temperature were normal, all redness and swelling of the foot had disappeared, and there were no further complications whatever in the subsequent course of the case.

CASE XVII. *Scarlet Rash following Burn.*

B. M., f., a healthy child, æt. 2, was admitted on the 3d April with an extensive scald of the chest and abdomen. She was suffering much pain, and was considerably collapsed. On the following day there was a red punctiform rash on the arms, legs, and thighs, but not on the abdomen, chest, or neck. It was perceptible to the touch, and

faded on pressure. There was no sore-throat or enlargement of the cervical glands, and the papillæ of the tongue were not red or prominent. Two days after the first appearance of the rash it had begun to fade, and there was at the same time slight furfuraceous desquamation of the cuticle, which only continued for a day or two. On the 8th April there was no sign either of rash or desquamation, and the child ultimately recovered from the scald without further complication. The temperature chart showed a rise to 102° on the day after the rash appeared, but it fell to 100° next day. On the 9th it rose again to 102°, after which it speedily subsided to the normal limit.

CASE XVIII. *Eruption after Operation for Hæmorrhoids.**

A young lady, æt. 26, was operated on for hæmorrhoids on June 15th of the present year by the method of 'crushing,' an operation in which the base of the piles is crushed by a powerful clamp, and the protruding portions removed with scissors.† On the following day the patient stated that there had been no pain at the seat of the operation, but she complained of pain in the abdomen, and there was some sickness. The pulse was about 80, and the temperature normal. The tongue was not clean, and she looked uncomfortable. A dose of calomel and opium was ordered, with some Carlsbad salts next morning. On the following day she still felt ill, though the temperature remained normal; the bowels acted freely and without pain, and the sickness had nearly ceased. She was ordered a saline effervescing draught every four hours. Next day (the third after the operation) she looked much improved in face, but she complained of a rash on her body. On examination an eruption, very similar to that of measles, was observed over the scapulæ, shoulders, and upper part of the back; it appeared also on the lower part of the back, and half way down the arms. The forearms, legs, face, chest, and abdomen were free from it. All trace of the eruption had disappeared next day, and the patient expressed herself as much better. The patient made a favourable recovery, and neither sequelæ nor subsequent infection followed.

Mr. Pollock informs me that he has many times observed a similar eruption after operations in the neighbourhood of the rectum. On one occasion the rash was exactly like that of scarlet fever, but there was no rise of temperature. Much irritation of the skin was associated with it. After having covered the whole body the eruption disappeared entirely in three days, leaving the patient quite well in health, though some desquamation of the skin followed.

* For the notes of this case I am indebted to Mr. Pollock.

† For further details of this operation, see description by Mr. Pollock, *Lancet*, July 3, 1880.

Urticaria following Puncture of Hydatid Tumours of the Liver.

Dr. Bradbury* of Cambridge has published several cases of hydatid disease of the liver treated by aspiration, among which there were two in which an urticarial rash followed the first puncture. The eruption appeared on the first and second day respectively after the operation, and in each subsided in the course of two or three days.

The same phenomena, under similar circumstances, are mentioned by Dieulafoy,† and also by Dr. Murchison,‡ as being of not unfrequent occurrence.

Eruptions after Circumcision.

Within the last few months no less than seven cases of scarlet rash have occurred at St. George's Hospital§ in the practice of the house surgeons, Messrs. Hunt and Sheild, amongst the out-patients. All the cases occurring after the operation for phimosis, and within two to four days of the operation.

In four instances the symptoms were correctly diagnosed to be scarlet fever, and the cases were removed to a fever hospital, where they ran an ordinary course, and in some instances were followed by the usual sequelæ. In the remainder, both rash and the slight fever attending it quite subsided in the course of two or three days, without causing further infection, and in two instances at least, among the latter, desquamation ensued. In all these cases, it may be remarked, the wounds ran a uniformly unhealthy course.

Herpes after Catheterisation.

Two cases of eruption after catheterisation have also recently come under my notice. In each there was, soon

* *British Med. Journal*, 1874, vol. ii. pp. 525 and 558. I have to thank Dr. Bradbury for calling my attention to these cases, as well as to the two following references which had escaped my notice.

† *Traité de l'Aspiration des Liquides Morbides*, pp. 63 and 91.

‡ *Diseases of the Liver*, second edition, p. 74.

§ As these cases were not received into St. George's Hospital, I regret that I have not been able to get more complete notes; but the text may be relied upon as a true account of the bare facts.

after the passage of an instrument, acute urethral fever, the temperature in one case reaching 103°, and in the other 105°, preceded by rigors so severe as to very forcibly suggest pyæmia. On the day following there was in each case an outbreak of herpes about the mouth, face, and neck, which gradually passed off; but in one of the cases the temperature, though it fell somewhat after the outbreak of herpes, remained high for some days.

Though very severe symptoms and high fever are often met with after the passage of urethral instruments, it had not fallen to my lot to notice eruptions of the skin under like circumstances before, but some of my colleagues have informed me that the occurrence is familiar to them. Such cases are instructive as showing the probable agency of reflex action in the production of this and similar rashes, as the presumption is that there was no wound. It will not escape notice how very frequently any surgical interference with the genital organs is followed by these eruptions.

Herpes after Wounds.

A similar eruption has been observed by Verneuil to follow cutting operations. One such case was made the text of a clinical lecture,* and he concludes by saying that we must count herpes as one of the complications which may attend wounds. It may appear either on the surface of the wound or at a distance; and it is noticeable that the outbreak is usually accompanied by rigors, a high temperature, and other severe constitutional symptoms.

Here, then, we have a number of eruptions of various kinds following not only wounds, but also other surgical treatment and affections, not necessarily involving the presence of an external wound. The one feature common to them all is their occurrence in relation to an injury or operative measure. It will be, however, noticed that the relation, in point of time, between the rash and the wound is not nearly so uniform as in the scarlet-fever cases; this probably arises from the fact that they are so much fewer

* *Lancet*, 1878, vol. ii. p. 873.

in number. A larger number would, in all likelihood, show a considerably greater uniformity.

The nature of some amongst them is evident, being distinctly urticarial, papular, or vesicular; whatever they were they were not scarlatina, and bore no resemblance to that disease. But as regards many of the others, the erythematous or rose-coloured rashes, it is clear that there must have been room for very considerable doubt. On the one hand, they occurred sometimes where it was hardly possible that infection could have taken place, and they did not infect others, or else they were so transient as at once to preclude scarlet fever; while on the other, not only was the rash often precisely similar, but there was at times sore-throat, a suspicious tongue, and very often decided fever. In several instances, moreover, were the symptoms followed by more or less complete desquamation.

To prove a negative proposition is very often a difficult matter; and I am aware that in a given case it might be well-nigh impossible to show that it was not merely a slight and transient attack of scarlet fever. It has, however, been pointed out that the rashes are not invariably of such a nature as to simulate scarlet fever; many of them are distinctly of other types, having also a clear relation to some wound or surgical interference; and, as we have said, if we admit the existence of one kind of traumatic eruption we need have no difficulty in admitting another of a closely allied type. This, I think, we are bound to do in the face of the evidence afforded by the preceding cases, and by such opinions as that of M. Tremblay, Dr. Wilks, Dr. Cheadle, and others, which have been already quoted.

I venture to affirm, therefore, that there is evidence to show that *there occurs sometimes after wounds and injuries what may be called a simple surgical erythema, often closely resembling the rash of scarlet fever, but independent of any connection with that disease; and that other eruptions of different type may similarly occur under like circumstances.*

Nevertheless, it is admitted on all hands that the difficulty of diagnosis between simple surgical erythema and

the rash of scarlet fever is often very great, and we may now well ask ourselves if there are any certain means whereby we can distinguish between them.

It is, I think, certain that no diagnosis can be based on the appearance of the rash itself. I am acquainted with at least one case where the resemblance to the scarlatina rash was so great that the patient with it was at once sent off to a fever hospital, on the advice of an experienced physician, where it proved after all not to be that disease; and in most cases that I have seen the likeness was so great as almost irresistibly to suggest scarlet fever, and to deceive those who were not familiar with the phenomena. Dr. Wilks* also has told us how close the resemblance has usually been in the cases in which he has been asked to give an opinion.

Neither can we rely on any evidence afforded by the mode of appearance or of the distribution over the body of the rash, as we have seen that there are considerable irregularities in this respect in cases of acknowledged scarlet fever in like circumstances, and even in ordinary scarlet fever uncomplicated with wounds considerable variations are met with; but it will be not unfrequently found, I think, that in these cases the face is unaffected, or that the rash is confined entirely to the extremities, which is not usually the case in ordinary scarlet fever.

As far as it is possible to offer any opinion, I think the most reliable guides will be found in the duration of the rash, the amount and duration of the febrile symptoms, and the appearance of the tongue.

Usually in simple surgical erythema it is found that the rash subsides in the course of twenty-four or forty-eight hours, and with the subsidence of the rash the febrile symptoms commonly disappear; though two cases will be found amongst those here reported where the rash remained visible for five days.† Still, in the majority of cases, there is no doubt but that it subsides much sooner.

In ordinary scarlatina the fever often runs very high,

* Loc. cit.

† Cases IX. and XIII. It will be remembered that the former was possibly a case of scarlet fever.

and continues after the appearance of the rash, though it is also true that in slight cases there may throughout be scarcely any rise of temperature at all. In simple surgical rash the temperature as a rule, I think, will not be found very high, though some rise is often present. The highest I have met with in one of these scarlatiniform eruptions was 102°, which, however, very shortly dropped to the normal after subsidence of the rash. On the other hand, in one of the cases of herpes after catheterisation, there was acute fever, the thermometer reaching 105°, and remaining high for some days; and Verneuil also notes the high temperature in the case of traumatic herpes reported by him; so that, perhaps, very much reliance cannot be placed upon the absolute height reached.

In two instances only* does sore-throat appear to have been present, and in one other (Case V.) the fauces are described as being reddened. We have seen, however, that in real scarlet fever after wounds, this symptom is very often absent, so that the presence or absence of this can scarcely guide us in the matter.

In only one of the cases mentioned in the table was there any characteristic appearance of the tongue recorded. In this (Case XVI.) the papillæ are reported as red and enlarged, but in none of them is the tongue described as having the 'strawberry' appearance so often seen in scarlet fever. I am inclined to believe that in the state of the tongue we have a valuable guide for diagnosis. In those cases previously mentioned as occurring among out-patients in the experience of the house surgeons, this was found to be the case; and relying in great part upon this sign they were enabled, in spite of difficulties, successfully to diagnose and separate those that were scarlatinal from the others, which proved to be simple surgical rashes.

These points of difference on which to base a diagnosis correspond pretty closely with those enumerated by Dr. Cheadle.† The only matter in which I would venture to differ from him is that of desquamation. He considers

* Cases II. and IX. See previous note.

† Loc. cit.

that this does not usually take place in the simple surgical rashes; but it will be seen that this event occurred in several of those here related; and I have seen it happen in other cases of erythema, where there was no question of scarlet fever. There is no point, however, in which I am more inclined to agree with Dr. Cheadle than in his expressed opinion, that a differential diagnosis is sometimes absolutely impossible; and on this account I think the rule laid down by Mr. Howse* is a safe one, viz. that in all these cases the same precautions should be taken with regard to isolation as if the case were clearly one of scarlet fever.

I am not aware that these cases of non-scarlatinal rashes are ever followed by albuminuria, or other ordinary sequelæ of scarlet fever. In the few cases I have seen, recovery has usually taken place quickly, and the patients, having left the hospital, have become lost to view before the occurrence of such events might be anticipated; but in one or two where this has not been the case I have failed to find albumen in the urine after some time. It would be interesting to know whether this is uniformly the case, though I see no reason to doubt it.

We must now again approach a question similar to that discussed before in the case of scarlet fever, viz. the relation existing between the wound and the rash; and I think in this case it will be possible to arrive at a more definite conclusion than in the former, though at the best it is one which still leaves much to be explained. In the case of scarlet fever, we saw the difficulty there was in associating the outbreak of a specific fever with a wound which was often no more than a puncture, evidence being wanted to show that the poison was directly inoculated; but in the present instance we have to deal with one of a numerous class of analogous cases, which are perhaps less surrounded by difficulties of explanation.

We are aware how the administration of certain drugs, such as copaiba, belladonna, quinine, chloral, salicylic acid, the inhalation of ether and chloroform, errors of diet, and even certain kinds of food, have a similar effect in produc-

* *Guy's Hospital Reports*, 1879, p. 462.

ing eruptions of erythema or urticaria, quite comparable to those in question. In these I think it is very probable that the explanation of the effects is to be sought for in disturbances of the vaso-motor actions. Either, these substances introduced into the stomach act reflexly on the vaso-motor tracts, the gastro-intestinal nerves being the afferent elements concerned; or the substances, being absorbed into the blood, act directly on the vaso-motor centres, the result being in either case a dilatation of the cutaneous vessels, and the consequence a blush or erythema. I think we shall not be far wrong if we seek a similar explanation in the case of the surgical rashes in question.

Among surgical pathologists Billroth, in particular, has pointed out the share that the absorption of the inflammatory products of a wound probably has in the production of the group of symptoms known as surgical or inflammatory fever, and he particularly insists upon the fact that 'the secretion poured out by a wound during the first forty-eight hours is especially active.'* He further goes on to say that there is no one specific fever producer, but that the number of such substances is probably immense.

Now I can see no difficulty whatever in supposing that some one or more of these irritant products may, in the case of surgical rashes, act in a precisely similar manner to the above-mentioned drugs;† but whether we are to consider the resulting vaso-motor actions as caused reflexly, or by the direct action of the irritant material on the centres themselves, it is not easy to say. In the case of the inflammatory fever there is some evidence‡ to show that the action is not reflex, but direct; though, on the other

* Billroth, *Surgical Pathology*, New Sydenham Society's translation, vol. i. p. 124.

† See Dr. M. Foster's *Physiology*, third edition, p. 191: 'It is more than probable that many substances introduced into the blood, or arising in the blood from natural or morbid changes, may affect blood-pressure by acting directly on the nervous centres.' Murchison also (op. cit. p. 74, note) thinks that the urticaria which frequently follows puncture of the liver for hydatid disease is due to the absorption of some of the contents of the sac which have escaped into the peritoneal cavity.

‡ Experiments of Breuer and Chrobak (Billroth, op. cit.).

hand, such cases as those related where urticaria followed the introduction of a speculum or the passage of a gall-stone, and the cases of herpes after catheterisation, would seem to show that the whole process may be, and often is, a reflex one.

It will be noticed how very frequently the symptoms follow interference with certain parts of the body, such as the generative organs, in the normal functions of which reflex actions play such a prominent part; and it must not be forgotten that in nearly all surgical operations the skin is interfered with, which also is deeply concerned in reflex processes. Physiologists have told us how powerfully the course of reflex actions is influenced by transmission through the skin, it being much easier to produce a reflex action by slight pressure on the skin than by strong shocks applied directly to a nerve trunk. The comparative frequency with which the rashes in question follow burns and scalds, where it is the integument only which is implicated, seems to me to point in the direction of some such explanation, though I am well aware that there are many facts which strongly oppose such a view.

These explanations, however, leave quite untouched the question, what determines the nature of the rash—why it should be in one case urticaria, in another herpes, and in the majority simple erythema, just as the explanation is equally impossible in the case of the drugs before mentioned; but we cannot at present even speculate upon this point. With regard to herpes, which seems to be of rarer occurrence than the others, I am inclined to think that it will be found associated with much more profound constitutional disturbance than either urticaria or erythema.

In any case, the size of the wound need not necessarily be a determining factor. It may be truly said that there is no wound or no focus of inflammation so small that it may not, under suitable circumstances, be a channel leading to effects far more potent and severe than those we are now considering. The products of inflammation, be they what they may, can be as readily absorbed through a small wound as through a large one, and the prick of a

pin will originate the profoundest reflex action. But if the absorption theory be a correct one, we should find that those conditions, such as the antiseptic treatment, which have led to so great a diminution of inflammatory fever, presumably by lessening or preventing decomposition at the seat of wound, and so preventing the absorption of irritant material, should have a marked effect also in checking the symptoms we have been describing. It yet remains to be seen whether this is truly so. From the observations of Dr. Goodhart, it would seem not to be the case; for in his experience, as well as in my own and that of others, wounds treated strictly after the antiseptic method enjoyed no immunity from the occurrence of the rash. On the other hand, even if there be no absorption of irritant matter, we have in the irritation of the skin by the surgeon's instruments a possible cause for the production of reflex actions.

There is great reason for believing that the processes of simple surgical or inflammatory fever merge into, and are closely allied to, the more profound conditions known as septicæmia and pyæmia. These too, it has been incidentally remarked, are often associated with characteristic cutaneous manifestations, and the subject is obviously incomplete without investigation of these also. Closely allied, however, as they are, with those we have been considering, to do more than merely allude to their existence would lead me far beyond the limits to which it is fitting that the present thesis should extend.

Note.

There has quite recently come under my observation a paper read before the Dublin Obstetrical Society (*Dublin Journal of Medical Science*, April 1, 1880) by Dr. G. H. Kidd, which, I think, lends considerable support to some of the views here advanced. This observer points out that it is not an unfrequent occurrence for women to be affected by a transient rose rash shortly after delivery, which he proposes to call 'erythema uterinum' or 'roseola uterina.' He states that on the third, fourth, or fifth day after delivery an eruption is found exactly like that of

scarlet fever occurring in broad patches, which affect successively different parts of the body. There is neither fever nor any other untoward symptoms whatever associated with the rash, which begins to disappear in two or three days after its first appearance, and it is not followed by desquamation; convalescence is in no way retarded, and no sequelæ are observed to follow. Dr. Kidd observed these appearances in three per cent of the cases attended by him, and they have been noticed also by Dr. McClintock and Dr. Lombe Athill.

This still further, I think, strengthens the analogy between the puerperal and traumatic states; and the fact that the former may be followed by an eruption which is clearly not scarlatinal, as well as one which is, lends additional probability to the argument that similar events may occur also in the traumatic state. We have in the 'erythema uterinum' another instance of the close relation existing between events taking place in the sexual apparatus and in the integument. In a very large proportion of cases here recorded, in which simple (non-scarlatinal) eruptions have followed surgical interference, the interference has been with parts connected with the organs of generation; and on the supposition that these eruptions are reflex vaso-motor actions, the process is, as we have have said, quite in accord with what we know of the normal physiology of those organs. If we admit the influence of the nervous system in the production of such eruptions as herpes zoster, and perhaps others also, there need, I think, be no difficulty in admitting its influence in the cases that have been considered.