

EPIDEMIC GENERALISED VACCINIA.

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THE occurrence of a general cutaneous eruption consequent upon vaccination, that is to say the inoculation of vaccine virus upon an abraded skin surface, is a possibility generally recognised. But the meagre literature of the subject, and the scanty and brief references in present-day text-books of medicine indicate that the condition is only occasionally encountered.

In Nothnagel's *Encyclopedia* (American edition) a few lines are given to "accidental symptoms" classed as (1) macular erythema, (2) accessory pocks due to auto-inoculation; and a brief allusion is made to a vesicular or bullous eczema following vaccination.

In Allbutt and Rolleston's *System of Medicine*, under Vaccination in Man—a Clinical Study, Acland enters into detailed descriptions of vesicular eruptions, which, following Longet, he groups as (1) spontaneous eruptions, (2) eruptions generalised by auto-inoculation. It appears, however, that he does not regard them as of much practical importance.

In Osler's *System of Medicine*, under Irregular Vaccinations, three conditions are described: (a) local variations, (b) generalised vaccinia, (1) vesicles in the neighbourhood of the primary vesicle—not uncommon, (2) a true generalised pustular rash, beginning between the eighth and fourteenth days, in which secondary pocks may continue to appear for five or six weeks. This, it appears, may prove fatal in children but is less common than (1).

The rarity of generalised vaccinia is also indicated by the fact that in the six years 1902—1908 over five hundred thousand persons, mostly

natives, have been vaccinated in Natal with glycerinated calf-lymph, but nothing of the sort has been reported.

The occurrence, then, in epidemic incidence, of febrile illness and constitutional disturbance associated with general vesicular eruption, following upon vaccination with glycerinated calf-lymph, appears to be sufficiently important to merit the attention of those interested in preventive medicine.

Before proceeding further it is well to make a brief statement of the circumstances in which natives are vaccinated, so that the reason for lack of precision in some statements may be appreciated. With six exceptions all cases reported have been of natives.

All vaccination in Natal is done with calf-lymph, which must, in accordance with law, be issued or approved by the Health Officer for the colony. Arm to arm vaccination is prohibited. The magistrate in each district arranges certain places as centres convenient for assembling of natives, which are in due course visited by the district surgeon. Many of the centres, to which children are brought from as far as ten miles, are twenty miles or more from the magistracy, and in consequence nothing is known as to the results unless the natives themselves complain or report to officials, missionaries or storekeepers. Thus a few isolated cases of unusual sequelae to vaccination would pass unnoticed; but if the cases were numerous or the illness severe the matter would be reported and the possibility of such an occurrence following vaccination would quickly become known, after which even insignificant cases would be brought to notice.

It cannot therefore be concluded that because no reports have been received from any one district that no such results have ensued at all, but it certainly may be taken that such occurrence was exceptional.

The eruptive manifestations may roughly be divided into three classes:

I. In twenty per cent. a generalised eruption appeared simultaneously all over the body, from about the fourteenth to the twenty-eighth day after vaccination, in many instances after the scab had fallen off.

II. In seventy-five per cent. secondary vesicles appeared round the original vesicles on about the eighth day, followed by crops in various parts of the body for the next two months, in some cases even for three months.

III. In the remainder an eruption followed one of the preceding types, then subsided altogether, to reappear a month or two later after some ailment or a burn.

The vaccination scab in a few instances persisted over the twentieth day, but the local reaction was seldom severe. In group I it usually separated before the eruption appeared; in about a third of the cases in group II it persisted longer, usually with some induration round it but always separated before the crops of pocks ceased to appear. In many instances an impetiginous condition appeared round the scab but was very amenable to treatment.

The generalised eruption of group I appeared as small macules surrounded by a slightly injected area, the redness disappearing on pressure. The hard, shotty feeling so characteristic of the papule of variola was not observable. The child would be petulant and feverish. In two or three days the macules were succeeded by vesicles, at first the size of a millet seed, which in six days attained the size of a nux vomica seed. Umbilication was frequently noted. If the vesicles were broken a watery or a reddish-stained jelly-like matter exuded. About the eighth day they became pustular, and secondary fever supervened; the itching appeared to be severe.

The eruption affected the buccal mucous membrane, gums, palate and pharynx and appeared particularly on forehead, neck and crown, where impetiginous crusts were formed. It was marked and in many cases confluent on the front of the neck; less on thorax and back, and scanty or absent from the abdomen; marked and often confluent on buttocks, and generally more extensive on the vaccinated than upon the other arm. It affected the palms almost always; was profuse as a rule on thighs and ankles, and in a few cases was observed on the soles. Two to three days were generally occupied in appearance of the eruption, which came out more or less in the order given above. The general appearance of a well-established case was that of a varioloid.

The limited eruption of class II began round the vaccination marks on or about the eighth day. It followed much the same line of distribution as the above, but its appearance was irregular and in some instances it continued for three months, crops of vesicles coming out in various situations, many healing up before others appeared. These in a number of cases only occurred in situations which admit of scratching, but in certainly as great a number were not so distributed, although there was a predilection for moist and warm spots, as the buttocks or points exposed to the chafing of garments, as the intrascapular region and the neck. For some children, particularly when digestion was disordered, a fine scaly condition was observed and in these the eruption

was always more severe but diminished when digestive disorders were corrected.

All the fatal cases seen, and many others with severe general eruption, suffered from broncho-pneumonia during the course of the illness or as a terminal affection. Diarrhoea was a feature of some and was more common in the later stages when, notwithstanding that the ulcerated surfaces, although extensive, were clean, the child passed into an asthenic condition and died of exhaustion. Deaths occurred only in late stages of the condition, the earliest five weeks after vaccination, and some as late as three months. The cause appeared to be septic absorption and no death was noted to have occurred until the eruption had been pustular for two weeks.

Class III comprised a few abnormal cases of which the following is an example :

Child aged two years, vaccinated May 4th and subsequently affected with mild general vaccinia of the type of class II. By the middle of June fresh pocks had ceased to appear. Early in July the child was severely scalded, and an area of foul suppuration of some twenty-two square inches resulted. One week later about thirty pocks similar to those of vaccinia appeared. General symptoms of serious illness supervened and death occurred in twenty-four hours.

We have found no evidence that the disease has been transmitted from person to person.

It is so obvious that the disease is a specific entity that the question of differential diagnosis needs not to be entered upon. If the cases had been few, or not confined to persons freshly vaccinated it might have been necessary to distinguish between it and varioloid or to consider as a possibility foot and mouth disease, impetigo contagiosa, or syphilis, but the epidemic incidence in vaccinated persons only precludes the possibility of error in respect to any of these.

Lymph from a vesicle on the foot of one child was inoculated upon a calf. The bacteriologist reported that it produced a line of "typical but not vigorous vesicles."

In respect to what may be termed the *epidemiology* it is to be noted that the illness in all cases ensued upon the use of lymph obtained from one source only, and that about three-fourths of the persons attacked were vaccinated from a parcel bearing one numerical index, the remainder from parcels indicated by four other numbers.

In round numbers 45,000 persons were vaccinated in the cool season

of 1909, the lymph used being obtained from three sources. Two parcels were received from the Jenner Institute sufficient for eight thousand and sixteen thousand vaccinations respectively, the first bearing only the one number 4698 and the second five numbers. Lymph 4698 was sent out to eleven districts.

The second parcel was designated by five numbers: 4782, 4785, 4786, 4787, 4788. It was distributed to fifteen districts and about thirteen thousand vaccinations were effected from it. The lymphs were used mainly for vaccinations of natives, but a few hundred Indians and a score or so of Europeans were also vaccinated with them.

A notable feature in the incidence of vaccinia is that six-sevenths of all cases occurred in up-country districts, and one-seventh only in the coastal area, although three-fifths of the lymph was used in the latter. This is particularly marked in the case of 4698, after the use of which in three out of four up-country districts the disorder was epidemic, affecting in greater or less degree about fifteen per cent. of those vaccinated, numbering about two thousand three hundred, although in the fourth district five cases only were recorded. In four of the other districts no case was notified, and in the remaining three four cases were reported. Thus, while in the up-country districts as a whole the incidence was about one in eight of persons vaccinated with lymph from this source, in the warmer districts it was less than one in one thousand. In several of the warm districts the lymph was reported to have given a weak reaction and a low percentage of successful results.

TABLE.

Showing the number of Districts to which lymph from several parcels was issued, and the number of cases and of deaths which were reported.

Lymph numbers:—	4782 & 4785			4786				4787 & 4788			4698			Total				
	Number of Districts	Issue	Cases	Deaths	Number of Districts	Issue	Cases	Deaths	Number of Districts	Issue	Cases	Deaths	Number of Districts	Issue	Cases	Deaths	Cases	Deaths
Cool Districts	6	1452	0	0	4	346	50	1	6	2700	13	0	4	2946	300	27	363	28
Warm Districts	6	4000	50*	1	6	960	2	0	6	3000	6	2	7	4550	4	0	62	3
Total	12	5452	50	1	10	1306	52	1	12	5700	19	2	11	7496	304	27	425	31

* As full enquiry as possible was made, and only such fatal cases are entered as there appeared to be reasonable ground for attributing to the results of vaccination.

The distribution of the lymph and the approximate number of cases of generalised vaccinia of which information was received is shown in the preceding Table (p. 141).

The climate in different parts varies considerably. Near the coast line it is humid, and during the cool season as hot in the day time as an English summer day in July or August. Some inland parts are of considerable elevation, from two thousand to four thousand and more feet above sea level; the sky in winter is generally clear, rain rarely falls, and though the sun's rays are strong the heat is tempered with a crisp atmosphere, while at night several degrees of frost are often registered. It is then possible that the freedom of the lower districts is attributable to a rapid reduction in virulence in the higher temperature. This is to some extent supported by the experience of one of us, that a portion of lymph which had been kept in a warmer place than the rest gave rise to no general eruptions.

We are not particularly concerned in this communication in the causes of generalised vaccinia, that is, the reason why the infection becomes generalised in some persons and remains a strictly local reaction in others. The condition is indicated by writers to be very uncommon. The natural conclusion from the paucity of cases in general is that generalised vaccinia is not due to any particular quality of the lymph used but to some other cause. In this instance, however, it is clear that some quality or character of the lymph itself was responsible for the consequences. It is assumed that the number given to a lymph issue is given for purposes of identification, and that all the lymph of the same number is derived from the same calf. That being so it appears that general vaccinia has ensued upon the inoculation of lymph of six different calves, which suggests that the peculiar quality was inherent in the strain of lymph, and not in the reaction of a particular calf. It is also likely that the effect was modified by atmospheric temperature, and that the small number of eruptive cases in the fourth up-country district after the use of 4698 was due to the exposure of that portion to a higher temperature while in possession of the vaccinator.