ROSEOLA INFANTUM

AN OUTBREAK IN A MATERNITY HOSPITAL

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Roseola infantum was first described by Zahorsky (1910), and since this time cases have been recorded by many writers both in America and Europe but the disease has received little recognition in England. It has been labelled exanthem subitum and sixth disease but Zahorsky (1947) and others have put forward a plea for the retention of the name roseola infantum or the 'rose rash of infancy'.

The infectious nature of the disease was discussed by Barenberg and Greenspan (1939), who report it to be periodically epidemic in an institution for children and describe an epidemic of twenty-seven cases occurring over a period of three months, the incidence of infection in the respective wards being 35 per cent. and 45 per cent. The incubation period was five to fifteen days with an average of twelve days. Cushing (1927) describes an epidemic in Montreal with incubation periods between eight and fourteen days.

Most cases occur during the first two years of life, and the maximum incidence seems to be between six and eighteen months of age. Conte et al. (1944) found 95 per cent. of cases to be under two years of age, and in the series described by Barenberg and Greenspan (1939) 93 per cent. were under this age, the youngest being four months. Dickey (1945) has seen one case at six weeks old, another at nine weeks, and his oldest patient was a boy of four years. Zahorsky (1910) and Greenthal (1941) both cite cases aged eighteen years, and Cutts (1938) records a case aged thirty-one years which he regarded as undoubtedly one of roseola infantum.

Roseola infantum is characterized by an abrupt onset with a rise of temperature up to 103 or 104° F., which persists for two to five days and falls by crisis. A rash appears usually as the temperature falls but may be delayed for a few days. It is macular, rose pink in colour, and spreads from the trunk to the limbs and face, but is most profuse over the trunk; it reaches its maximum in twenty-four hours and fades during the next twenty-four hours, usually without desquamation.

The child may be fretful and irritable as the temperature rises, there may be convulsions at the

onset, but generally there is remarkably little constitutional disturbance. Conte et al. (1944) describe eighteen cases occurring in hospital over a ten-month period, and among these nine had one to six convulsions at the onset. Most other writers record fits much less often.

Glandular enlargement is described but does not seem to be a constant finding, although Jennings (1940) stated that enlargement of the posterior cervical glands, without apparent cause in the scalp, in an infant with a high temperature and with no other clinical findings should suggest the diagnosis of roseola infantum, and in fact this sign led him to diagnose 80 per cent. of his cases of this disease prior to the eruption.

Examination of the blood on the second or subsequent days may reveal leucopenia. In the cases described by Barenberg and Greenspan (1939) 50 per cent. showed leucopenia on the third day, 64 per cent. on the fourth day, and only 25 per cent. on the seventh day. A relative lymphocytosis was present in 66 per cent. on the third day and in all the cases on the fourth day. Zahorsky (1947) and others stress that the lymphocytosis is only relative and that the important factor is the decrease in the polymorphonuclear cells.

The mortality rate is nil, and the recovery is rapid and complete.

The etiology has been discussed by Conte et al. (1944), who put forward three possibilities: (1) allergy, (2) grippe-like infection, (3) virus infection. Most writers incriminate the virus although Breese (1941) tried and failed to demonstrate a filterable virus in throat swabs from three of his cases.

An Epidemic in a Maternity Hospital

The following description of an epidemic in a maternity hospital of a disease conforming to descriptions of roseola infantum is thought to be of interest because such cases have not been recorded in England or in such young infants, and also because a proportion of the nurses, mothers, and fathers were also affected.

The outbreak occurred between June 26 and

FIG. 1.—Case 7 and mother, temperature and weight.

FIG. 2.—Case 15, temperature and weight.

Aug. 7, 1948. During this period there were 144 babies in the hospital, but the epidemic was confined to one floor of the hospital only, on which there were sixty-five babies. Nineteen were thought to have roseola infantum, but in only sixteen was the diagnosis definitely established by clinical findings and by the typical temperature chart. In eight cases (six infants and two mothers) the diagnosis was confirmed by the blood picture. The first two cases were at first labelled as 'pyrexia of unknown origin', and not until we had studied the disease more closely did we include them in the series. The

infectivity rate among the babies on the affected floor was 29·2 per cent.

New cases occurred at intervals of one to thirteen days (average two to three days), and the age of onset was eight to twelve days (average eleven days). In one doubtful case the pyrexia started on the fifth day of life, and another baby was eighteen days old when the illness started.

In addition five nurses working on the affected floor developed characteristic symptoms, and a history of a similar illness was obtained from six mothers and four fathers. Three mothers developed the disease while in hospital.

All nineteen babies with roseola infantum were breast fed. A past history of having had rubella was obtained from three of their mothers, one of whom developed symptoms and exanthem of roseola infantum herself while in hospital. Of the remaining mothers, only three were able to say with certainty that they had not had rubella, and thirteen gave a history of measles and one of glandular fever.

Clinical manifestations. The condition was characterized by high fever, rash, and glandular enlargement, and in the majority of cases by an astonishing absence of any constitutional upset. In the adults the clinical picture was rather different and will be dealt with later.

TEMPERATURE. The temperature was an outstanding feature and indicated the onset of the disease. There was a sharp rise to 103° F. or higher (figs. 1, 2, 3); it remained up for twenty-four to seventy-two hours, showing an occasional drop of 0·5 to 2°, but rose again before the characteristic fall by crisis. The temperature then remained normal except in ten cases, where there was a

FIG. 3.—Case 17, temperature and weight.

TABLE
ANALYSIS OF NINETEEN CASES.

Case No.	Age (in days) at onset	Temperature		Rash	Glands	Day	Blood picture					Urine	Comments
		Max.	Fall				Total W.B.C.	% Polya. neut.	% Lympho- cytes	% Mono- cytes	% Eosino- phils	% Path. lymphos.	
1	5	103 ⁴	Crisis										Lethargy. Physical signs in chest. Mother developed roseola infantum in hospital.
2	8	102	Crisis									Pus + + B. coli.	Mother and father developed similar disease
3	9	103 ⁴	Crisis	At onset of pyrexia	Cervical axillary occipital inguinal								Mother and father developed similar disease
4	10	103 ⁴	Lysis		Occipital axillary cervical							Pus + B. coli + Strep. faecalis.	Mother developed roseola infantum
5	11	103 ⁴	Lysis	With fall of temperature	Occipital axillary cervical							Pus + No growth	
6	16	103 ⁴	Lysis		Occipital axillary							Pus + B. coli.	
7	15	103	Crisis	After fall of temperature	Occipital axillary inguinal								Mother developed roseola infantum. W.B.C. 5,400. Eosino. 1%. Polys. 57%. Path. lymphos. 35%. Lymphos. 4%. Monos. 3%. Paul Bunnell neg.
8	11	104	Crisis	With fall of temperature	Cervical occipital axillary								Lethargy. Transient signs in chest. Broncho- pneumonia.
9	10	102 ⁶	Crisis	With fall of temperature	Occipital axillary								Mother and father developed similar disease
10	9	102 ⁶	Crisis	With fall of temperature	Occipital cervical axillary								Mother developed roseola infantum in hospital. W.B.C. 6,200. Polys. 67%. Mono. 7%. Lymph. 24%. Path. lymph. 3%.
11	8	103 ⁴	Crisis	Prior to pyrexia. Faded with crisis	Occipital axillary	2nd	4,000	29	58	9	1	3	
12	8	103	Lysis	With fall of temperature	Axillary inguinal								Lethargy with pyrexia. Mother and father developed similar disease.
13	11	102	Lysis	At onset of temperature	Occipital axillary cervical	2nd 5th	10,000 10,000	40 65	41 28	10 6	7 6	2 1	Mother developed roseola infantum.
14	11	99 ⁸	Crisis	At onset of temperature	Occipital cervical axillary	2nd	13,000	43	41	8	—	2	
15	11	103	Crisis	With fall of temperature		2nd 5th	8,200 10,300	18 43	79 54	4 —	4 —	1 3	
16	16	103	Crisis	With fall of temperature	Occipital inguinal								
17	8	104 ⁸	Crisis	With fall of temperature		2nd	20,000	62	34	17	3	1	Blood count taken after convulsion.
18	18	103	Crisis	With fall of temperature	Occipital axillary	2nd	11,000	80	18	2	—	—	
19	9	103	Crisis	With fall of temperature	Occipital axillary inguinal								Transient signs in chest.

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second peak up to 100° F. about forty-eight hours later which was only sustained for a few hours. In one case the temperature rose to only 99·8° F., but the presence of a typical rash, glandular enlargement, and neutropenia made us include this case.

RASH. The rash was seen in fifteen cases. The other four were early cases and it is possible that the rash was overlooked. As can be seen in the accompanying table, the rash usually appeared as the temperature fell or shortly after. In two cases the rash appeared with the pyrexia, and in one it occurred before the pyrexia, but in this case the etiology of the rash is in doubt since it also persisted for eight days.

The rash began on the chest and very soon spread to the limbs, abdomen, and back. In only a few cases was the face involved, and in no cases were the palms and soles affected. The exanthem consisted of macules, 2 to 4 mm. in diameter, which were usually surrounded by an area of erythema. On the back and the limbs the macules tended to be more confluent and in some areas had a scarlatiniform or a morbilliform appearance. All these features were present in different areas in one case at the same time. A macular rash, however, was most usual, and there were never any vesicles or pustules. The rash varied in intensity in the same infant, and usually faded, without desquamation or staining of the skin, in about twelve to twenty-four hours.

ENLARGEMENT OF THE LYMPH GLANDS. This was another prominent feature and was usually noticed soon after the onset of pyrexia. The occipital glands were enlarged in fourteen cases, the axillary glands in fourteen, those of the posterior triangle of the neck in seven, and the inguinal glands in five. In the first two cases of the series enlarged glands were not looked for, whilst in two others the glands were not enlarged, but in these cases other characteristic features were present and therefore they were included in the series.

The glands were enlarged to the size of a pea, were discrete, and never suppurated.

In no case was the spleen found to be enlarged.

OTHER FEATURES. Certain other features were found in some cases. At the onset of the illness in five cases there was some dullness on percussion of the chest, and in two of these moist sounds were audible on auscultation suggesting a bronchopneumonia. These signs, however, disappeared in twelve to twenty-four hours. In some cases there was slight injection of the palate and pharynx, and in some the tympanic membranes were injected, but this was attributed to the pyrexia.

There was no vomiting or diarrhoea, and no jaundice. Most of the babies had normal vigour and fed well. Only four babies lost weight, the maximum loss being 4 oz.; four babies failed to gain weight during the period of pyrexia, and the remainder gained weight steadily throughout.

One infant had a major convulsion at the onset of the infection.

Pathological investigations

URINE. In the early days of the outbreak every case had an examination of the urine performed. Altogether ten specimens were examined and the results are put forward in the accompanying table.

BLOOD. In a number of cases white-cell and differential counts were done on the second or third day of the illness, and in two cases they were repeated several days later. In addition blood counts were done on two mothers who developed the disease while in hospital, and in one of these a Paul Bunnell test was also taken and found to be negative.

Leucopenia and neutropenia were usually found, although in one infant the cell count totalled 20,000 per c.mm. of blood with 62 per cent. of polymorphonuclear cells. This count, however, was taken shortly after a convulsion (see table).

Treatment. No treatment was required in most cases. Those infants with abnormal physical signs in the chest or excessive pus cells in the urine were given penicillin and/or sulphonamides, but no difference was noted in the course of the disease, nor was there any alteration in the temperature curves.

Manifestations of roseola infantum in adults. Five nurses, all of them contacts with the affected babies, developed the disease.

The first nurse developed pyrexia, severe retro-orbital headache, photophobia, and general malaise. There was definite neck rigidity and a doubtful positive Kernig's sign was elicited. She was transferred to an isolation hospital where a lumbar puncture was performed and normal cerebrospinal fluid was obtained. Several days later her temperature fell and she developed a rash. She was discharged without a definite diagnosis having been made.

Four other nurses developed similar symptoms with pyrexia followed by a macular rash, and three of them were transferred to fever hospitals. They were discharged with the tentative diagnosis of atypical rubella.

Three mothers developed a similar condition while in hospital, and we heard from six others who developed severe malaise followed by a rash on the face and limbs after they reached home. The onset was within fourteen days of the onset of roseola infantum in their babies. A similar condition, with very severe retro-orbital headache, has been reported in four fathers. These cases were seen by their private doctors who were unable to make a certain diagnosis but suggested rubella as a possible cause. The mothers themselves felt certain that it was the same disease which they had seen in the babies in the hospital.

The striking coincidence and similarity of symptoms and signs in the nurses and parents led us to conclude that there was a common etiology and that the disease was indeed roseola infantum.

The blood pictures obtained in two mothers was characteristic.

Differential diagnosis. Measles can be excluded by the absence of typical prodromal coryza, the time relationship of the rash to the temperature, and by the differential white cell count. Dickey (1945) gives excellent charts comparing the prodromal periods, the degree and duration of temperature, the fall by crisis or lysis, and the relation of fever to rash in roseola infantum, rubella, measles, and scarlet fever. He also gives charts showing the varieties of temperature curves and the times of appearance of the rash in roseola infantum. The age incidence in our epidemic was also strong evidence against measles.

Rubella was considered a likely diagnosis early on in the epidemic mainly because the first nurse to be affected was provisionally labelled as a case of rubella, but later this was thought not to be so, and she was discharged from an isolation hospital with no definite diagnosis.

The babies developed the disease from the sixth to the eighteenth (average eleventh day of life) and usually the rash appeared after the temperature had fallen by crisis. These two factors together with the blood findings do not suggest rubella. Hynes (1940) performed serial blood counts on sixty-one adults with rubella and concluded that there was a leucopenia at the onset with an absolute lymphopenia, but that an absolute lymphocytosis occurred after the fifth day, the total count rising to normal by the tenth day. He found Turck cells present in every case and plasma cells appeared in from half to two-thirds of the cases. Rosenblum (1945) gives figures for the blood changes in roseola infantum, and shows clearly that there is leucopenia with marked neutropenia by the third day and that the lymphocytosis so often described is only relative.

A high percentage of our cases had generalized glandular enlargement, but glandular fever was excluded by the blood counts, and by a Paul Bunnell reaction in one case.

The clinical picture in the adults differed somewhat from that in the infants but the temperature

curves and the time of onset of the rash was similar in all cases. Wallfield (1934) describes a girl of twelve years who was admitted with the clinical picture of encephalitis, but was eventually proved to have roseola infantum. She had a two-day history of high fever, vomiting, headache, vertigo, and stiffness of the neck. The temperature fell by crisis on the third day and a typical rash developed. Her cerebrospinal fluid was normal but her blood count showed the typical changes. There were no sequelae. This description closely resembles that found in our adult cases.

The epidemic described in this paper was, therefore, considered to be one of roseola infantum, but was unusual in that it affected the newborn, and also a relatively high proportion of adults.

Summary

1. A review of the literature concerning roseola infantum is given, together with a description of the disease drawn from these records.
2. An epidemic of roseola infantum occurring in a maternity hospital is described.
3. The differential diagnosis is discussed.

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