most likely resulted from the hemoglobinuria. Generous hydration and alkalinization of the urine are then necessary to prevent precipitation of casts and resulting renal damage.

ADDENDUM: Additional follow-up studies could not be made in the case discussed because the patient was killed in an automobile accident one month after her last visit to the clinic.


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# Mucocutaneous Lymph Node Syndrome with Encephalopathy in the Continental United States

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RECENTLY, three papers have appeared in the pediatric literature calling attention to acute febrile mucocutaneous lymph node syndrome (MLNS),[1-3] an illness that previously had been seen only in Japan and Hawaii. This illness is an acute febrile mucocutaneous condition accompanied by swelling of cervical lymph nodes. Fatalities were reported in 1 to 2 percent of cases.[1] In each instance, the cause of death was proved to be myocardial infarction secondary to coronary thromboarteritis. The findings were almost indistinguishable from those of infantile polyarteritis nodosa.[4] Fetterman and Hashida[5] commented, "Whether or not MLNS is a problem of any degree in the continental United States . . . should become apparent within the next year or so." Reported here is a case of MLNS that occurred in the San Francisco Bay Area in May 1975. The illness was consistent with that described by Kawasaki and colleagues[1] on the basis of their experience, their review of the Japanese literature, findings from a Japanese public health survey that included nearly 4,000 cases and their awareness of more than 6,000 cases reported up to 1973. An additional manifestation in the infant described here was focal encephalopathy.

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## Report of a Case

An 8-month-old white girl was admitted to Kaiser Foundation Hospital, Santa Clara, California, on May 25, 1975 because of high fever, seizures, apnea, rash and diarrhea. On May 19 (four days before admission), ampicillin had been given for an ear infection. When the infant was seen as an outpatient on May 24 (one day before admission), fever, a macular rash on the arms and diaper area, and conjunctival injection were noted. Because measles was suspected, the ampicillin was discontinued. On May 25, before the patient was admitted to hospital, four generalized tonic-clonic seizures and a period of apnea necessitating resuscitation had occurred.

When admitted the patient was comatose and febrile, and a generalized macular morbilliform rash was seen to be present. Noted were conjunctival injection, erythema of the buccal and pharyngeal mucosa, swelling and prominence of the tongue papillae simulating strawberry tongue, and cervical lymphadenopathy. The liver edge was palpable 4 cm below the costal margin. The palms of the hands and soles of the feet were erythematous. The present illness was considered to have started May 22, the first day of fever. The clinical features and the duration of each are shown in Figure 1. Details not evident from the figure are given below.

From the 1st day of illness through the 18th,

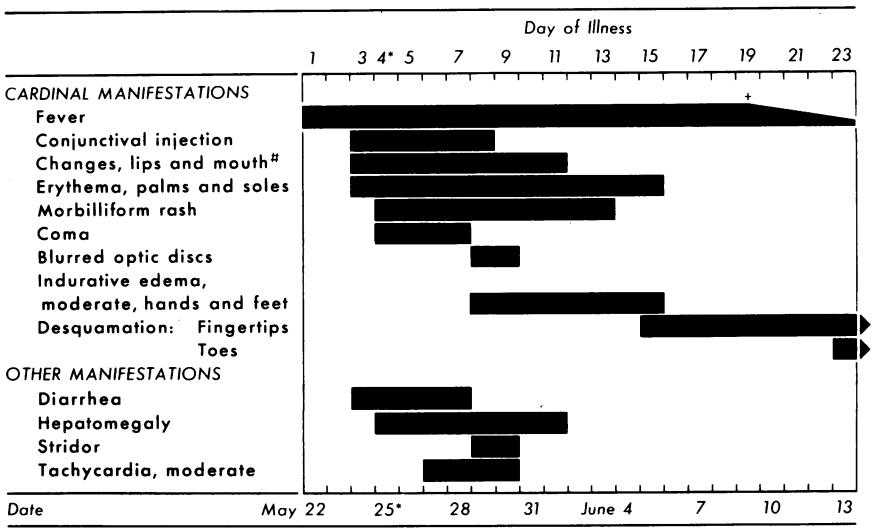


**Figure 1.—Times of appearance and disappearance of manifestations of mucocutaneous lymph node syndrome in an 8-month-old infant.**

*Admitted to hospital.
+Fever began to abate.
# Protuberance of tongue papillae (strawberry tongue), erythema of buccal and pharyngeal mucosa.

ABBREVIATIONS USED IN TEXT
IPN = infantile polyarteritis nodosa
MLNS = mucocutaneous lymph node syndrome

the temperature spiked from 36.7 to 39.2°C (98 to 102.5°F). Starting on the 19th day, it underwent a slow spiking descent, reaching normal by the end of the 22nd day.

The infant was comatose to semicomatose on the day of admission, then slowly regained consciousness and was normally alert by the end of the fifth hospital day (days 4 through 8 of the illness). An electroencephalogram on the seventh day of illness showed occasional recurrent spikes over the right parietal area. The cerebrospinal fluid contained 21 mg of protein per dl; 5 mononuclear cells and 105 red blood cells per milliliter. Cultures of the fluid grew no organisms. No abnormalities were seen on brain scan. Administration of diphenylhydantoin was started. The optic discs were noted to be blurred on the eighth and ninth day of illness. Findings on electroencephalogram on the 18th day of illness were normal. No abnormality was seen on a chest roentgenogram or on serial electrocardiograms.

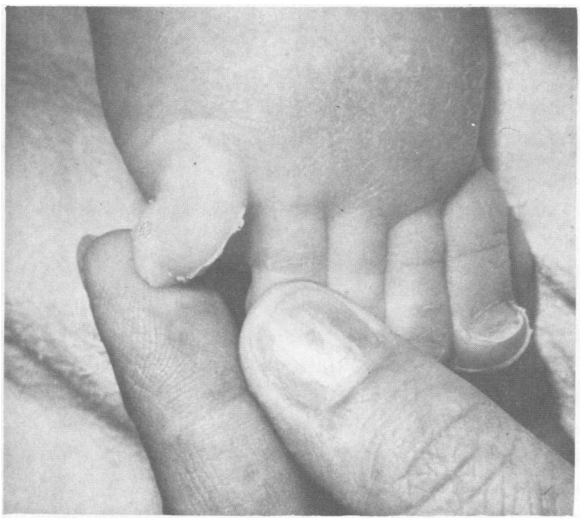

**Figure 2.—Desquamation of toes, which started on the 23rd day of illness.**

Slight desquamation of the trunk started on the 11th day of illness; desquamation of the fingertips started on the 15th day and of the toes on the 23rd day (Figure 2).

Representative findings in studies of blood and urine are shown in Tables 1 and 2. Briefly, there were the following findings: peripheral leukocytosis with neutrophilia, accelerated erythrocyte sedimentation rate, anemia, leukocytes in the urinary sediment, minimal proteinuria, serum glutamic oxalic transaminase (SGOT) elevation, positive C-reactive protein, negative antistreptolysin-O titer, and increased $\alpha_2$ globulin. Serologic studies were negative for influenza A, influenza B, adenovirus, mycoplasmal pneumonia, respiratory syncytial virus, measles, rubella and cytomegalic inclusion virus.

Therapy directed toward the symptoms of MLNS included administration of ampicillin, dexamethasone and diphenylhydramine hydrochloride. The infant's condition slowly improved and she was

TABLE 1.—*Representative Findings in the Blood of an 8-Month-Old Patient with Mucocutaneous Lymph Node Syndrome*

| Day of Illness | Cell Count per ml: Leukocytes | Polymorphonuclears | Nonsegmented Neutrophils | Lymphocytes | Monocytes | Eosinophils | Metamyelocytes | Hematocrit Percent | Hemoglobin g/dl |
|---|---|---|---|---|---|---|---|---|---|
| 4 | 13,800 | 29 | 51 | 17 | 1 | .. | 2 | 30 | 10.3 |
| 5* | 8,800 | 39 | 31 | 22 | 5 | .. | 3 | 32.1 | 10.6 |
| 9 | 24,100 | 70 | 15 | 12 | 1 | 1 | 1 | 27.2 | 8.6 |
| 12† | 17,800 | 60 | 5 | 26 | 3 | 2 | 2 | 27.7 | 8.7 |
| 13‡ | 13,700 | 49 | 12 | 34 | 4 | .. | 1 | 25 | 8.0 |
| 19§ | 20,000 | 53 | 12 | 29 | 6 | .. | .. | 27.5 | 8.5 |

*Platelet count, 314,000/ml.
†Erythrocyte sedimentation rate, 57 mm/hr.
‡Reticulocyte count, 4.9 percent.
§Erythrocyte sedimentation rate, 63 mm/hr.

TABLE 2.—*Representative Urinary Findings**

| Day of Illness | Specific Gravity | pH | Protein | Cells in Sediment/hpf: Leukocytes | Erythrocytes | Casts |
|---|---|---|---|---|---|---|
| 5 (a.m.) | 1.015 | 5 | 2+ | 25-35 | .. | 25-50† |
| (p.m.) | 1.028 | 5 | 1+ | 60-80 | .. | 2- 5‡ |
| 6 | 1.002 | 5 | .. | .. | .. | .. |
| 7 | 1.021 | 5 | .. | 30-40 | .. | .. |
| 8 | 1.010 | 6 | .. | 30-40 | .. | .. |
| 9 | 1.007 | 7 | .. | 15-20 | .. | .. |
| 11 | 1.012 | .. | .. | 5- 9 | 3-5 | 2- 5§ |

hpf = high power field

*Suprapubic urine collection showed no bacterial growth.
†Hyaline and fine granular casts.
‡Hyaline and granular casts.
§Hyaline casts.

discharged two and a half weeks after admission. Therapy with diphenylhydantoin has been continued, and there have been no further seizures. The patient now appears well.

## Discussion

This patient's illness included the following "principal symptoms" listed by Kawasaki and coworkers:[1] (1) fever lasting three weeks and not responding to therapy with antibiotics, (2) bilateral congestion of ocular conjunctivae, (3) changes of lips and oral cavity (dryness, redness and fissuring of lips; protuberance of tongue papillae resembling strawberry tongue; diffuse reddening of oral and pharyngeal mucosa), (4) changes of peripheral extremities (reddening of palms and soles; indurative edema; membranous desquamation from digit tips), (5) polymorphous exanthema of body trunk without vesicles or crusts and (6) minimal nonpurulent swelling of cervical lymph nodes (no large nodes were noted).

In only 75 percent of the cases reported by Kawasagi and colleagues[1] was there swelling of the cervical nodes; whereas all of the other findings occurred with greater frequency. In 60 percent of the patients, all of the principal manifestations occurred; one or two manifestations were lacking in the remaining cases.

The illness in the case reported here also included the following "other significant symptoms or findings" mentioned in these workers' description of MLNS:[1] (1) diarrhea, (2) proteinuria and increased number of leukocytes in the urinary sediment, (3) changes in blood test values (leukocytosis with shift to the left, slight decrease in erythrocyte and hemoglobin levels, increased erythrocyte sedimentation rate, positive C-reactive protein, increased $\alpha_2$ globulin, negative antistreptolysin-O (ASLO) titer and slight increase in the SGOT.

Encephalopathy first occurred on the day of hospital admission, the third day of the illness. A lowered level of consciousness persisted for four days. Abnormalities on electroencephalogram were noted, and anticonvulsant therapy was begun and continued. No further seizures have been observed.

There was no evidence of carditis other than moderate tachycardia. No abnormalities were seen on x-ray studies of the chest or electrocardiograms. The infant is presently in good health.

Serial coronary angiography of 20 survivors of MLNS[6] showed abnormalities in 12 (60 percent). In seven (35 percent), coronary aneurysms were present, two of which regressed. Mitral regurgitation developed in one patient. Fetterman and Hashida[5] cited a Japanese language report by Tanaka[7] about 13 patients studied postmortem who had died of MLNS: thrombotic necrotizing coronary arteritis with aneurysmal dilatation was found in all. Morphologic findings described in reports of fatal MLNS are indeed indistinguishable from those of infantile polyarteritis nodosa (IPN).[5] The diagnosis of IPN has been made antemortem

based on angiographic findings in two children.[8,9] Fetterman and Hashida[5] agreed with Tanaka[7] that a clinical resemblance often exists between IPN and MLNS.

In response to careful inquiry, the parents of the infant in the case reported here stated that they knew of no relatives, neighbors or other persons with whom the family has come into contact who had traveled to Japan or Hawaii.

## Summary

An infant seen in the San Francisco Bay Area with signs and symptoms suggesting measles was found to have mucocutaneous lymph node syndrome (MLNS) with an additional feature, focal encephalopathy. Therapy with antibiotics, adrenocortical steroids and antihistamine was used. Improvement in the condition of the patient occurred during two and a half weeks in hospital. Anticonvulsant therapy is being continued. Seven months after the onset of the illness no sequelae are evident.

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## Pointers in Antianxiety Pharmacotherapy

A cause for concern is if the condition of a patient is temporarily stabilized on a specific dosage of medication, but he then begins to request an increased dosage. This means to me either worsening of life stresses, deterioration of psychological coping mechanisms (perhaps indicative of a more serious mental disorder), or the developing of abuse and addiction. Sometimes the patient will complain that no tranquilizer he has tried is satisfactory, in any dosage, but may keep demanding a different drug and higher doses. This is also indicative of a serious problem. Keep careful records of all prescriptions written, with notations indicating when the patient should be running out of pills . . . be suspicious if a patient tells you he has run out of medication sooner than your records indicate he should, or if he tells you that he has lost his prescription or lost his pills—particularly if this happens more than once. If it does happen more than once, I am certain he is taking more than what has been prescribed. The patient should be confronted with this problem and be advised to seek professional mental health intervention. Another problem which arises not infrequently is a patient getting tranquilizer prescriptions from more than one physician. Sometimes this is because the patient shops around and keeps it a secret. But other times this is the result of insufficient communication between the family physician and the psychiatrist or mental health agency to which the patient is referred. The patient may openly continue to see the referring physician who continues to prescribe tranquilizers or sleeping pills while the psychiatrist continues to do the same, neither taking the effort to check what the other is doing with the patient. This problem arises in two ways: The referring physician does not call or write the psychiatrist explaining the reason for referral, but instead just sends the patient to present the problem himself; or the psychiatrist does not recontact the referring physician to work out a joint treatment plan.

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