A Preterm Infant with a Characteristic Erythematous and Scaly Rash After Birth

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THE CASE

A preterm infant born at 26 weeks' gestational age presents with a rash that evolves into an erythematous and scaly rash on the second day after birth (Figs 1–4).

Prenatal and Birth History

- Born to a 20-year-old gravida 2, para 0 black woman with adequate prenatal care.
- Fetal survey: Normal.
- Maternal medical history includes bacterial vaginosis, candidiasis, and trichomoniasis, all treated before the current pregnancy.
- Screening for gonorrhea/chlamydia, HIV, hepatitis B, and syphilis: Negative.
- Pregnancy was complicated by posterior placenta previa.
- She presented in preterm labor and was noted to have group B *Streptococcus* (GBS) bacteriuria. She received 2 doses of betamethasone, magnesium sulfate, penicillin G, and ampicillin.
- Amniocentesis was performed to rule out an intra-amniotic infection because sludge was observed in the amniotic fluid on ultrasonography.
- Female infant was delivered vaginally at 26 3/7 weeks' gestation after unstoppable preterm labor; rupture of membranes occurred approximately 4 hours before delivery; no maternal fever.
- Apgar scores of 1, 5, and 8 at 1, 5, and 10 minutes of age, respectively.
- Birthweight: 1,030 g (85th percentile); length: 36 cm (85th percentile); and head circumference: 25 cm (36th percentile).

Presentation

At delivery, the infant emerged limp and had persistent apnea that required positive pressure ventilation followed by endotracheal intubation. She was transferred to the NICU, where she received 1 dose of endotracheal surfactant and the team placed umbilical catheters. She underwent extubation to receive noninvasive ventilation and started trophic feedings on the second day after birth. Because of the history of preterm labor and maternal GBS bacteriuria, the infant was started on empiric intravenous ampicillin and gentamicin while awaiting blood culture results. On the day of birth, the infant was noted to have an erythematous and scaly rash with tiny papules all over her body, but primarily on her back. On the second day after birth, the rash progressed to other areas of the body and became drier and scalier (Figs 1–4).

Physical Examination Findings (Day 2)

- Heart rate: 145 beats/min
- Respiratory rate: 50 breaths/min

AUTHOR DISCLOSURE Drs Jani, Ariss, and Chawla have disclosed no financial relationships relevant to this article. This commentary does not contain a discussion of an unapproved/investigative use of a commercial product/device.

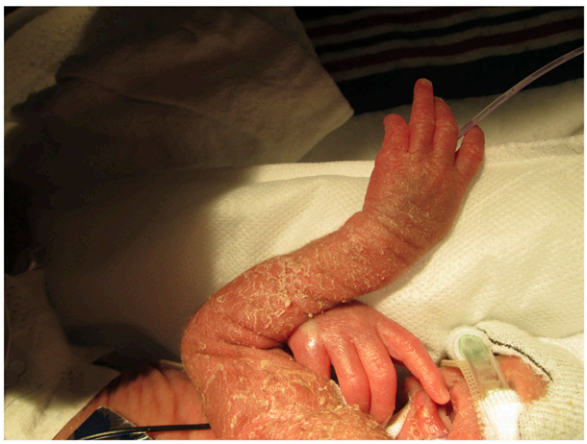

Figure 1. Scaly and erythematous rash over the arm, day 2 after birth.

- Blood pressure: 43/24 mm Hg, mean 33 mm Hg
- Oxygen saturation: 94% (fraction of inspired oxygen of 0.3 on continuous positive airway pressure [CPAP])
- General: Active, responsive
- Head, eyes, ears, nose, and throat: Normocephalic, nares patent, anterior fontanelle open, soft, and flat; CPAP prongs in place
- Respiratory: Good air exchange bilaterally, clear to auscultation, mild subcostal retractions
- Cardiovascular: Regular rate, regular rhythm, S1 auscultated, S2 auscultated, no murmur
- Gastrointestinal: Soft, nontender, nondistended, normal bowel sounds
- Genitourinary: Normal preterm female external genitalia
- Integumentary: Warm, dry, widespread scaly erythematous skin lesions all over her body, more significant involvement on the back
- Neurologic: Normal tone and posture for gestational age

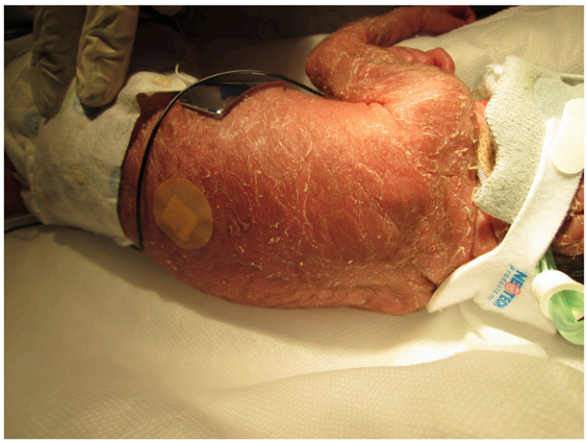

Figure 2. Scaly and erythematous rash over the back, day 2 after birth.

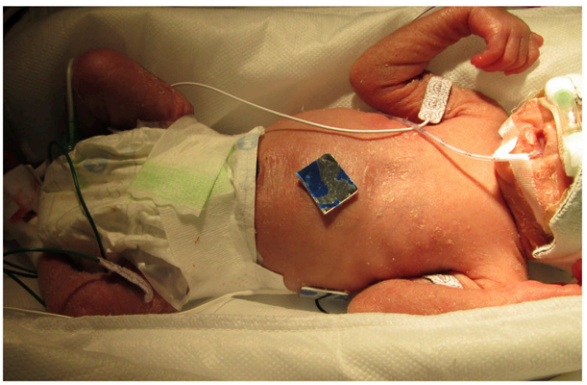

Figure 3. Rash over the chest and abdomen, day 2 after birth. Note that the rash is not as pronounced on the trunk as it is on the back and arms.

Laboratory Studies

- C-reactive protein: 1.8 mg/dL (18 mg/L)
- White blood cell count: 30,600/μL (3.6×10^9/L) with 69% neutrophils, 7% bands, 10% lymphocytes, 11% monocytes, 1% eosinophils, 2% metamyelocytes
- Hemoglobin and hematocrit: 11.5 g/dL (115 g/L) and 33.5% (0.35), respectively
- Platelet count: 232×10^3/μL (232×10^9/L)
- Sodium: 137 mEq/L (137 mmol/L)
- Potassium: 5.2 mEq/L (5 mmol/L)
- Chloride: 104 mEq/L (104 mmol/L)
- Bicarbonate: 21 mEqL (21 mmol/L)
- Blood urea nitrogen: 23 mg/dL (8.21 mmol/L)
- Creatinine: 0.75 mg/dL (66.3 μmol/L)
- Arterial blood gas (on noninvasive ventilation): pH 7.3, P_{CO_2} 50 mm Hg (6.6 kPa), P_{O_2} 65 mm Hg (8.6 kPa), bicarbonate 24 mmol/L (24 mmol/L), base deficit 2.5 mEq/L (2.5 mmol/L)

DIFFERENTIAL DIAGNOSIS

Bacterial infection (GBS sepsis, *Listeria monocytogenes*)
Nonbacterial infection (congenital candidiasis, congenital herpes simplex virus, congenital enterovirus, congenital syphilis)
Transient neonatal pustular melanosis
Congenital nonbullous ichthyosiform erythroderma
Ritter disease

FURTHER COURSE

The infant's vital signs, including blood pressure, remained stable. She continued to receive noninvasive ventilator support and tolerated her trophic feedings. Ultrasonography of the brain showed a small germinal matrix hemorrhage on the left side. A peripherally inserted central catheter was

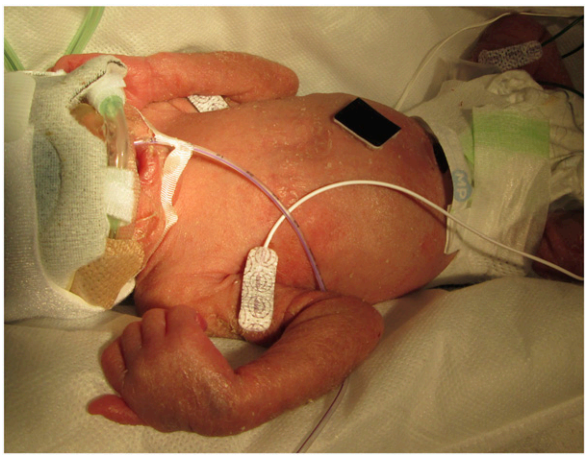

Figure 4. Rash over the chest and abdomen, day 2 after birth. Note that the rash is not as pronounced on the trunk as it is on the back and arms.

placed, and umbilical lines were removed on the second day after birth.

The maternal amniotic fluid culture grew numerous *Candida albicans*. Hence, a potassium hydroxide (KOH) preparation of the skin lesion was made, which showed fungal elements and hyphae confirming *Candida albicans* as the source of the rash. Evaluation for a systemic fungal infection included the following: blood fungal culture, urine analysis and urine culture for *Candida*, cerebrospinal fluid cell count and fungal culture, retinal examination, and ultrasonography of the liver, spleen, and kidney. All of these test results were negative. The infant was treated initially with liposomal amphotericin until systemic involvement was ruled out and then changed to fluconazole for a total treatment period of 14 days. The rash started to disappear on day 4 after birth and resolved completely by the end of the first week of age.

FINAL DIAGNOSIS

Congenital cutaneous candidiasis

WHAT DO THE EXPERTS SAY?

Congenital candidiasis is a rare condition with very few cases described in the literature. It appears to be acquired in utero when the causative organism from an infected vagina travels into the uterine cavity. However, the mechanism through which *Candida* can travel through the intact membranes is still not clear. Congenital candidiasis does not develop in all infants who are exposed to *Candida* in the amniotic fluid or the vaginal canal during birth.

In most neonates, congenital candidiasis manifests as a superficial skin rash. The rash can be diffusely present over the entire body, and typically involves the scalp, face, chest, abdomen, back, perineal area, and extremities. (1) Moreover, the skin rash is typically maculopapular, but it can have other presentations such as pustules, abscess, exfoliation, and desquamation. (1)(2) Even though it is rare, cutaneous candidiasis can progress and manifest as a systemic illness, especially in very-low-birthweight (<1,000 g) infants. An infant who develops early-onset invasive candidiasis usually has an increased mortality risk, with a higher risk for neurodevelopmental impairment if the infant survives. (3) Therefore, early diagnosis and treatment of cutaneous candidiasis is important to prevent systemic spread.

A maternal history of vaginal candidiasis provides a strong clue to the diagnosis of congenital cutaneous candidiasis (CCC). The maternal history of invasive procedures such as intrauterine devices, amniocentesis, embryo reduction, and cerclage can increase the risk for candidal chorioamnionitis. (4) The diagnosis of CCC is usually made on demonstration of the spores and pseudohyphae of *Candida albicans* in the scrapings of the skin rash. The diagnosis of CCC can also be made by demonstrating *Candida* chorioamnionitis or funisitis in an infant with a characteristic skin rash. (5) Blood, urine, and cerebrospinal fluid culture specimens should be obtained from term infants in whom systemic infections are suspected and in all preterm infants with CCC. In addition, a retinal eye examination and ultrasonography of the kidney, liver, and spleen should be performed to evaluate for fungal systemic involvement. In preterm infants, prompt systemic antifungal treatment (amphotericin or fluconazole) should be started at the time of skin presentation while awaiting culture results. Preterm infants with isolated CCC should receive systemic antifungal treatment for 10 to 14 days. (5) Term infants with isolated CCC usually have a self-limiting benign course (5) and can be treated with oral fluconazole for 10 days. (1)

The other possible diagnoses listed in the differential diagnosis are less likely for the following reasons:

Bacterial infection (GBS sepsis, *Listeria monocytogenes*): Infants with these bacterial infections can have a vesicular or pustular generalized rash. For those infants who develop a severe systemic illness associated with disseminated intravascular coagulation, the rash can be purpuric or petechial. Affected infants are typically sicker than the infant described in this vignette.

Congenital herpes simplex virus infection: Infants with congenital herpes simplex virus typically present with a coalescing or clustering vesicular rash with lesions on an erythematous base. The lesions can progress to pustules, crusts, or erosions.

Congenital enterovirus infection: This is uncommon and has a variable presentation, ranging from asymptomatic

to a sepsislike illness. The rash is typically maculopapular and if associated with sepsis, can be petechial or purpuric.

Congenital syphilis: The pathognomonic rash in newborns with congenital syphilis consists of hemorrhagic bullae that are located on the palms and soles and then involve the trunk and extremities.

Transient neonatal pustular melanosis: The rash consists of small pustules on a nonerythematous base; the rash is typically seen in 3 phases—with pustules that can rupture and leave a macule surrounded by scale; this is followed by a darkened macule. This rash is benign and usually presents at birth.

Congenital nonbullous ichthyosiform erythroderma: This rare type of ichthyosis is associated with a generalized white scaly rash with background erythematous skin. Affected newborns often present with a collodion membrane after birth. It has an autosomal recessive pattern of inheritance.

Ritter disease: This is the most severe form of staphylococcal scalded skin syndrome and is characterized by an erythematous rash with blisters all over the body caused by the exfoliating toxin of *Staphylococcus aureus*. The rash is associated with perioral crusting, and the mucous membranes are typically not involved.

American Board of Pediatrics Neonatal-Perinatal Content Specification

- Know the clinical manifestations and diagnostic features of neonatal fungal infections.

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