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CASE REPORT

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Collodion phenotype remains a challenge for neonatologists: A rare case of self-healing collodion baby

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Abstract

We report a unique case of self-healing collodion baby (CB) that was successfully managed despite the risk of potentially serious complications. Self-healing CB is a rare and distinct outcome of collodion phenotype occurring in approximately 10% of the cases. The outcome depends on the initial assessment and adequate multidisciplinary approach.

KEYWORDS

collodion baby, congenital ichthyosis, cornification, membrane, neonatal

1 | INTRODUCTION

Collodion phenotype is a common clinical presentation of a heterogeneous group of skin disorders of cornification. The term collodion baby (CB) was firstly introduced by Hallopeau and Watelet describing a parchment-like membrane that covers the whole body[1] is a rare clinical entity with an estimated incidence of 1 in 50.000 to 100.000 live births. Collodion phenotype is common to several different forms of autosomal recessive congenital ichthyoses including lamellar ichthyosis, nonbullous congenital ichthyosiform erythroderma, and harlequin ichthyosis.[2,3] The diagnosis of CB is clinical as the skin biopsy and histopathology in the first few weeks of life will not be useful in differentiating different types of ichthyoses. Recently, significant advances were made regarding the molecular basis of congenital ichthyosis by identifying several genes implication in the pathogenesis. The management of CB remains a challenge in the neonatal period as the complications occur in almost half of the patients with a mortality rate of approximately 11% in the first weeks of life.[4] We report a unique case of self-healing CB that was managed successfully despite the risk of potentially serious complications. Self-healing CB is a rare and distinct outcome of collodion phenotype occurring in approximately 10% of all collodion babies.

2 | CASE DESCRIPTION

A female-term newborn was born via spontaneous delivery to a 26-year-old healthy gravida 1 para 1 woman. The mother received routine prenatal care with all prenatal

laboratory and fetal ultrasound findings within normal limits. No consanguinity and no family history of skin disorders were reported. The birth weight was 3350 g, and the birth length could not be appropriately measured because of limited extension of the lower limbs. Apgar score was 9 and 10 at 1 and 5 min, respectively. At birth, the baby had a shiny, taut membrane that covered her entire body with multiple fissures and scaling (Figure 1). Additionally, bilateral ectropion, eclabium, hypotrichosis, flattening of the nose, and ears overlaying were present (Figure 2). The baby had claw hand deformity and pseudocontractures with limited range of motion in all joints (Figure 3). There were no other congenital anomalies.

The initial laboratory investigations showed increased inflammatory parameters: WBC 29.9×10^9/l, CRP level of 84 mg/L (normal <5 mg/L), and low PLT 79×10^9/l. Serum electrolytes, protein, albumin, blood urea nitrogen, and creatinine levels were monitored closely. Echocardiography, abdominal ultrasonography, and cranial ultrasonography showed normal findings. The baby was placed in an incubator with humidity set at 70%. Antibiotic treatment with ampicillin and amikacin was provided while waiting for the blood culture result. Skin management included daily bathing with water and mild cleanser and applications of emollients (Eucerin emollient cream and Aquaphor) every 3 to 4 h. Artificial tears were applied every 4 h to keep the corneas moist. Nasogastric feedings were initiated because of the patient's inability to suck. The incubator humidity was reduced every 3–4 days until reaching ambient air values. Temperature and fluid balance were monitored continuously. Bacterial swabs were performed twice a week from the flexures, eyes, and intravenous-line sites and were negative. After 10 days, there was a significant improvement in the skin findings as well as the extraverted palpebrae and lips. Breastfeeding was started followed by a good weight gain. Desquamation of the whole body appeared at 2 weeks, leaving nearly normal-appearing skin. The patient was discharged after 18 days with advice for regular emollient application and follow-up. At the age of 2 months, the skin was completely normal except for minimal residual erythema and very few white scales on the trunk and extremities. After 8 years of follow-up until date, the patient had no lesions except minimal hyperkeratosis on the elbows and knees.

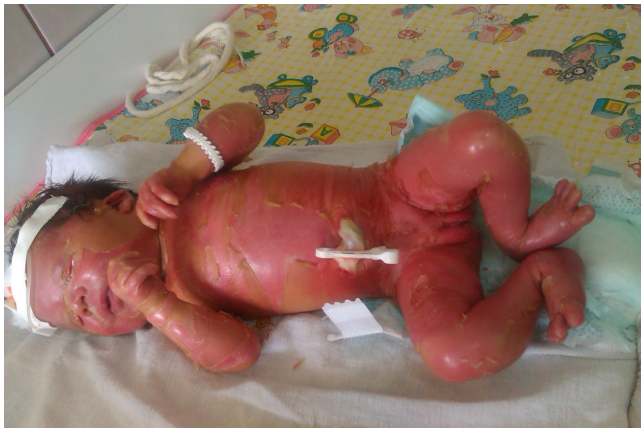

FIGURE 1 Parchment-like membrane covering the whole body, with multiple fissures and scaling

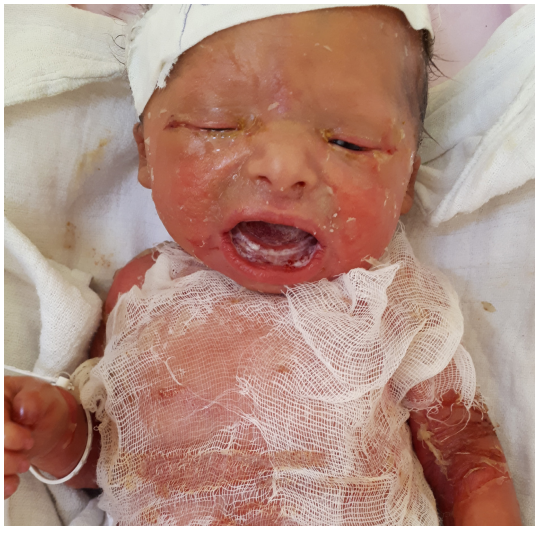

FIGURE 2 Excess of scales around the mouth gave the typical fish-like mouth appearance. Bilateral ectropion, flattening of the nose, and ears overlaying

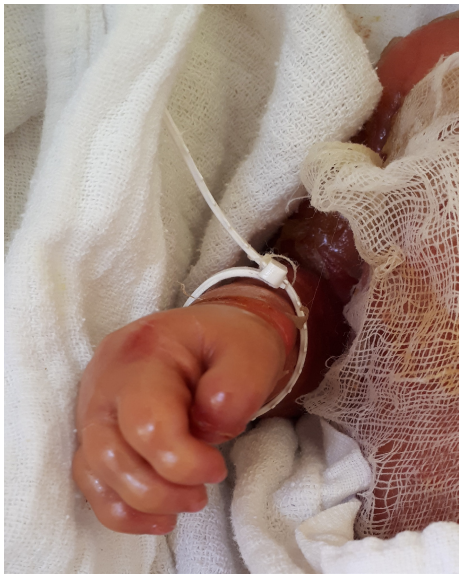

FIGURE 3 Clawed-hand deformity

3 | DISCUSSION

The collodion baby indicates a phenotype that precedes the underlying disease entity. It is characterized by a

yellow, shiny, tight parchment-like membrane that covers the body. As collodion babies look very much alike at birth, the outcome is difficult to predict. The initial severity of phenotype and time to membrane shedding may be indicative of the severity of the underlying condition. When the membrane peels off, underlying skin disorders may usually be revealed. It is considered that about 10% of all collodion babies heal spontaneously within the first few weeks and develop normal underlying skin.[4,5] This condition is called "self-healing" collodion baby or "lamellar exfoliation of the newborn."

The benign and self-limited clinical course of self-healing collodion baby distinguishes itself from lamellar ichthyosis. The cause of the self-healing collodion phenotype is not fully understood, and it is considered a dynamic phenotype, which refers to the possible clinical evolution of the disease over time.[6] Thus, using the term "self-improving collodion ichthyosis" as more appropriate is suggested by some authors as many of the collodion baby patients showed mild signs of ichthyosis when re-examined at 2–37 years of age.[7]

Although diagnostic guidelines are not uniformly established, the workup in CB should follow the algorithm presented in Figure 4. Several questions from patients' history (erythroderma or collodion membrane at birth, blistering, and associated symptoms) remain crucial for planning further diagnostic steps. Skin biopsy is not diagnostic in neonatal age as nonspecific diffuse orthohyperkeratosis is present in most of the cases.[2]

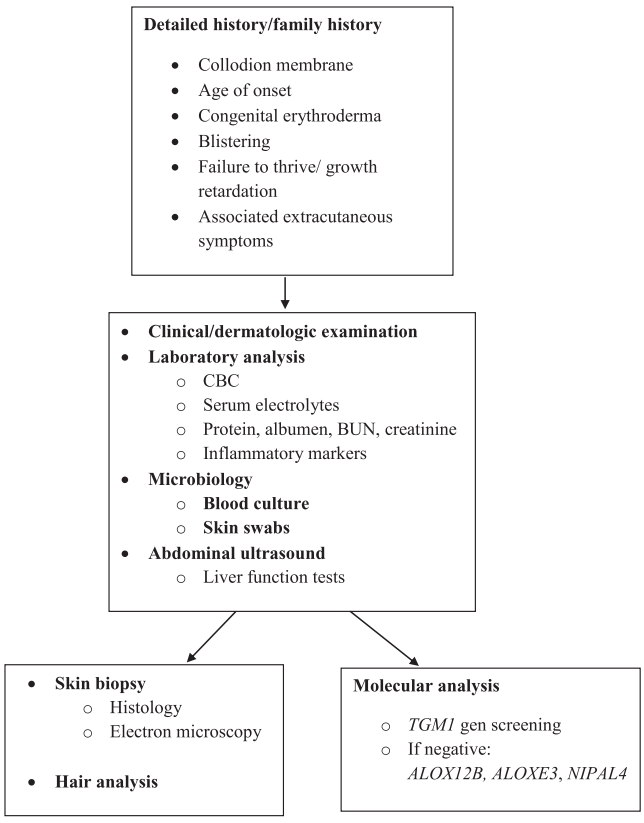

FIGURE 4 Diagnostic workup in a collodion baby

The clinical and histological overlap in these rare conditions implies the need for molecular testing in order to fully delineate self-healing from other types of ichthyoses. However, the genetic diagnosis may not have a predictive value because the genotype–phenotype correlations are not yet well established.[3]

Recently, mutations in the *TGM1* gene, encoding epidermal transglutaminase 1, which play an important role in lamellar ichthyosis and nonbullous congenital ichthyosiform erythroderma, have been linked to self-healing collodion phenotype.[8] Also, mutations in the *ALOX12B* gene, encoding 12(R)-lipoxygenase have been described to be relevant for SHCB.[7,8]

Several forms of inherited ichthyosis must be considered mainly based on the age of onset, appearance, and distribution of the scales (Table 1).[2,3,9] Patients with lamellar ichthyosis have large, dark, platelike scales on the entire body surface, ectropion, eclabium, and nail deformities. These patients usually do not improve with age. On the other hand, nonbullous congenital erythroderma is characterized by generalized erythema and fine white scales, mild ectropion, eclabium, hyperkeratotic palms, and soles. Harlequin ichthyosis is the rarest and the most severe form, and it is associated with respiratory and feeding difficulties, severe skin infections, and lethal outcomes in early infancy. Other milder phenotypes include ichthyosis vulgaris and X-linked recessive ichthyosis. Autosomal dominant ichthyosis vulgaris usually manifest between 3 and 12 months of age. X-linked ichthyosis is a genetic disorder caused by a mutation of the enzyme steroid sulfatase involved in the metabolism of cholesterol sulfate. It is presented at birth or early in infancy and affects males exclusively. Rarely, Sjögren Larsson syndrome, Netherton syndrome, Gaucher disease type 2, or some ectodermal dysplasias may be associated with collodion membrane and should be considered if extracutaneous symptoms are present.[10]

However, as the management does not differ for specific types of ichthyoses, the likely diagnosis in neonates can be made on clinical grounds only and will evolve into a more recognizable phenotype within the first months of life.

The principles of neonatal CB care are summarized in Table 2.[11,12] Although the vast majority of collodion babies are born at term, they require special neonatal care as premature babies. Various complications may occur, such as hypernatremic dehydration, hypothermia, skin infections, fissures, conjunctivitis, sepsis, constrictive bands of the extremities resulting in vascular compromise, and edema.[13,14] Thus, close monitoring of fluid balance and

TABLE 1 Main characteristics of congenital ichthyoses

Disorder/Inheritance	Age of onset	Type of scale	Localization	Other characteristics
Lamellar ichthyosis Autosomal recessive	Birth	Large platelike, erythroderma	Generalized, scales on flexors palms, soles	Collodion membrane, Ectropion, Eclabium, Nail deformities
Congenital ichthyosiform erythroderma Autosomal recessive	Birth	With fine, erythroderma	Generalized	Collodion membrane, Ectropion, Eclabium, Nail dystrophy, Growth delay
Harlequin ichthyosis Autosomal recessive	Birth	Large thick plates	Generalized	Ectropion Eclabium Dysmorphology of ears and limbs
X-linked ichthyosis X-linked	Birth or infancy	Dark brown, rough, rhombic scales	Neck, face, trunk	Corneal opacities Anosmia Cryptorchidism
Ichthyosis vulgaris/Autosomal dominant	Childhood	Fine scales	Palms, soles, extensors	Atopic dermatitis allergic rhino-conjunctivitis hypohidrosis, pruritus, Keratosis pilaris

TABLE 2 Principles in management of collodion baby

Management of collodion baby
- Admission to the neonatal intensive care unit
- Interdisciplinary approach
- Highly humidified incubator (>60%)
- Intensive monitoring of
  - body temperaturesssss
  - body weight
  - fluid balance
  - serum electrolytes
- Nutritional assessment:
  - caloric intake
  - naso/orogastric tube if necessary
- Skin care:
  - daily bathing
  - emollient three to eight times a day
  - antiseptics in erosive lesions
  - antifungal cream in macerated areas
- Eye care:
  - regular checkups
  - artificial tears
- Ear care:
  - removal of ear scales
  - perform a hearing screening
- Infection assessment:
  - standard precautions
  - regular bacteriological samplings
  - no prophylactic antibiotic treatment
  - avoid invasive procedures
- Constriction bands: preventative massage
- Pain: use of pain relief agents when required
- Psychological support
  - maternal–infant attachment
  - education

electrolytes balance, as well as signs of skin infections, is strongly recommended. Placement of the baby in a temperature-controlled humidified incubator is essential to reduce transepidermal water loss. The optimal temperature is 32–34°C with close body temperature monitoring to avoid hypothermia or overheating. The daily time out of the incubator should be gradually increased; however, most of the authors recommend maintaining in it for at least 4 weeks or until the membrane completely detaches.[15,16]

It is mandatory to practice all measures for the prevention of hospital infections. The use of intravenous lines and blood sampling should be very restrictive to avoid further skin damage. Local antiseptics such as aqueous chlorhexidine should be applied on venipuncture sites and on erosive skin lesions. However, the prophylactic use of antibiotics is not recommended. Ophthalmological management of ectropion is essential for preventing conjunctivitis and keratitis.[16] The skincare includes applications of bland emollients using techniques to evade possible contamination (latex-free gloves and single-use packets),

as well as avoiding active substances such as urea, lactic acid, or silver sulfadiazine due to the risk of percutaneous absorption.[11]

Recent advances in neonatal intensive care have improved the overall prognosis of CB. The outcome depends on the initial assessment and adequate multidisciplinary approach and treatment. Genetic diagnosis is particularly useful for genetic counseling and family planning, and it should become more common in the future together with better molecular characterization and development of pathogenesis-based therapies.

AUTHOR CONTRIBUTIONS

NZ had main contribution in literature search, writing, and drafting the manuscript. NZ, AK, AS, SJ, and KD were included in the diagnosing, care, treatment of the patient. KD was the pediatric dermatologist consultant, and she followed up the patient afterward. NZ, AK, AS, SJ, and KD edited the manuscript. All authors approved the final version.

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CONFLICT OF INTEREST

The authors declare that they have no conflicts of interest.

DATA AVAILABILITY STATEMENT

no data available

CONSENT

Written informed consent was obtained from the patient's parent to publish this report in accordance with the journal's patient consent policy.

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