

Collodion baby. Report of 14 patients

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ABSTRACT

The term collodion baby has been used to describe a transitory condition of the newborn, consisting in the presence of a translucent, adherent membrane that covers almost the entire body. It represents the initial feature of many diseases, the most frequent being lamellar ichthyosis and congenital ichthyosiform erythroderma. We present a series of 14 patients born as collodion babies and an updated revision of the literature. (Dermatol. Argent. 2011 17(2):128-133).

Keywords:

collodion baby;
lamellar ichthyosis

Submission date: 6/8/2010 | **Approval date:** 16/9/2010

Introduction

The term collodion baby (CB) was first introduced by Seligman in 1841 to describe a transitory condition of the neonate referring to the presence of a membrane which covers almost the entire body surface¹. It is not a disease per se, but a phenotype common to different entities². It is a rare condition, with a prevalence of 1 in 50,000-100,000 neonates born alive and it affects both sexes indistinctly³.

At birth, these patients present thickened, taut, smooth and shiny skin which looks like a transparent, flexible cellophane film. This wrapping usually hinders breathing and feeding. The condition is commonly associated with ectropion, eclabion, as well as with morphological alterations of the ears⁴⁻⁵. Such membrane cracks around 48 hours after birth and begins to peel off in sheets during the first few weeks of life, giving place to underlying normal skin or to the gradual emergence of manifestations characteristic of the underlying disease⁴.

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Table 1 summarizes the most frequent causes of CB described in the literature^{1,6-11}.

The aims of the present paper are: 1) to detect the predominant clinical entities associated with CB among our population; 2) to determine the main complications and mortality in this population; 3) to compare the collected data with the data provided by the literature.

Material and method

A retrospective, descriptive study was carried out at the Pediatric Dermatology Section in the Dermatology Department at Hospital Ramos Mejía. The medical histories of patients born as CB between September 1999 and May 2010 were revised. Most patients were evaluated within the first few days after birth, either at consultation at a Neonatology department or at derivation after hospital discharge with further follow-up at our Department. 14 patients with clinical diagnosis of CB were included in the study. The medical histories data and the anatomopathological and iconographic archives were analysed. Data concerning sex, age at consultation, perinatal and familial antecedents, neonatal complications, clinical manifestations, underlying cutaneous disorder and evolution were collected.

Results

Table 2 shows the main clinical-pathological data of the 14 patients with CB diagnosis. In 2 cases there was an initial consultation which enabled diagnosis, but there was no further follow-up.

Out of the 14 patients, 7 (50%) were male and 7 (50%) were female. Eight patients (57.1%) were evaluated during the neonatal period and 6 (42.9%) consulted after the first month of life. As regards the perinatal antecedents, 3 patients (21.4%) were premature, 1 of whom came from a gemelar pregnancy. Delivery was vaginal in 6 cases (42.9%) and C-section in the remaining 8 cases (57.1%). Familial dermatological history was positive in 4 patients (28.5%): ichthyosis (not specified) in 2 and hypohydrotic ectodermal dysplasia (HED) in the other 2 cases.

Perinatal complications included: sepsis suspicion in 3 patients (21.4%), sepsis confirmed through blood cultures in other 3 (21.4%), fissures in folds in 2 cases (14.2%), and respiratory distress syndrome (RDS) in 3 patients (21.4%).

All patients were covered by a translucent membrane which affected almost all their body at birth, except one case (7.1%), in which the membrane was limited to the acral surfaces. Besides, ectropion was observed in 7

TABLE 1. Collodion baby etiology.

ETIOLOGY	PERCENTAGE
NON-BULLOUS CONGENITAL ICHTHYOSIFORM ERYTHRODERMA (NBCIE)	50.00%
LAMELLAR ICHTHYOSIS (LI)	10.00%
ICHTHYOSIS VULGARIS (IV)	10.00%
SELF-HEALING COLLODION BABY (SHCB)	10.00%
TRICHOTHIODYSTROPHY	20.00%
SJÖGREN-LARSSON SYNDROME	
TYPE II GAUCHER DISEASE	
HYPOHYDROTIC ECTODERMAL DYSPLASIA (HED)	
CONRADI SYNDROME	
DORFMAN CHANARIN SYNDROME	
ICHTHYOSIS VARIEGATA	
KORAXITRACHITIC SYNDROME	
PALMOPLANTAR KERATODERMA WITH LEUKOKERATOSIS	
ANOGENITALIS	

Photo 1: Patient 1. Ectropion, eclabion and peeling membrane which covers the entire body surface. It corresponds to CB with fatal outcome.

patients (50%) and eclabion in 7 (50%). 6 cases (42.9%) presented hypoplasia on the ears. 2 children (14.2%) had fine, scarce hair and HED-like facies.

The clinical evolution of these patients was: lamellar ichthyosis (LI) in 5 cases (36.7%), two of which were confirmed by histology; non-bullous congenital ichthyosiform erythroderma (NBCIE) in 2 patients (14.2%), confirmed by histology; hypohydrotic ectodermal dysplasia (HED) in 2 children (14.2%), both confirmed by biopsy; and a case of acral collodion baby (7.1%). Patient number 10 does not yet have etiological diagnosis due to short follow-up time. Patient 1, with a histological diagnosis of LI/NBCIE, died at 2 months of age due to sepsis, which prevented us from reaching the final diagnosis of the underlying disease. Besides, long-term follow-up evidenced clinical manifestations of atopic dermatitis in 4 cases (28.5%), namely: the 2 patients with HED, a child with LI and one with NBCIE.

All the patients with underlying ichthyoses maintained the clinical characteristics of each disease, whereas the acral CB resolved completely.

TABLE 2

NUMBER	SEX/ AGE	PERINATAL ANTECEDENTS	FAMILIAL ANTECEDENTS	COMPLICATIONS	CLINICAL MANIFESTATIONS		BIOPSY	UNDERLYING PATHOLOGY	FOLLOW-UP
					CB	OTHERS			
1	F 4 d	TNB-AWFGA-VD	NO	SEPSIS RDS FISSURES	Ectropion, eclabion, ear hypoplasia, hands and feet in flexion.	NO	LI/NBCIE (4 d)	LI/NBCIE	Ichthyosis, death at 2 months, sepsis.
2	M 18 m	TNB-AWFGA-VD	NO	SUSPICION OF SEPSIS RDS	Ectropion, eclabion, ear hypo- plasia, hands and feet in flexion.	NO	LI (18 m)	LI	Ichthyosis.
3	F 9 d	TNB-AWFGA-CS	NO	SUSPICION OF SEPSIS	Ectropion, eclabion, ear hypo- plasia, hands and feet in flexion.	NO	NO	LI	Ichthyosis.
4	M 3 d	TNB-AWFGA-VD	HED in maternal uncle and nephew	NO	NO	Alopecia. Peculiar facies	HED (10 d)	HED	Atopic dermatitis.
5	F 8 d	TNB-AWFGA-VD	NO	SUSPICION OF SEPSIS	Ectropion, eclabion, ear hypoplasia.	NO	LI (16 m)	LI	Ichthyosis. Under treatment with N- acetylcysteine.
6	F 8 d	TNB-AWFGA-CS	NO	NO	Collodion membrane on hands and feet.	NO	NO	Acral CB	Complete resolution.
7	F 22 m	TNB-LWFGA-CS	NO	NO	Ectropion, eclabion, ear hypoplasia.	NO	IV (2 m)	LI	Ichthyosis. Under treatment with N- acetylcysteine.
8	M 3 m	PTNB 34 w-BW 1440- CS-oligoamnios	NO	RDS	Ectropion, eclabion, hands and feet in flexion.	NO	NO	LI	Ichthyosis. Atopic dermatitis.
9	M 1 m	PTNB 28 w-BW 1100-CS	NO	SEPSIS BY <i>S.</i> <i>EPIDERMIDIS</i>	NO	NO	NO	?	Ichthyosis.
10	M 2 m	PTNB-LWFGA- gemelar-CS-jaundice	NO	?	?	NO	NO	?	Ichthyosis. Atopic dermatitis.
11	F 7 d	TNB-AWFGA-CS	Ichthyosis in distant relatives	SEPSIS BY <i>ENTEROCOCCUS</i> AND <i>S.</i> <i>AUREUS</i>	Ectropion, eclabion, ear hypoplasia	NO	NO	No diagnosis yet.	Desquamation on body, scales on scalp.
12	M 15 m	TNB-AWFGA-VD	HED in maternal uncle and cousin	NO	NO	Alopecia. Peculiar facies. Anodontia	HED	HED	Atopic dermatitis. Anodontia.
13	M 11 d	TNB-AWFGA-VD	NO	NO	NO	NO	NBCIE (7 m)	NBCIE	Ichthyosis.
14	F 15 y	TNB-AWFGA-CS	Mother: 2 spontane- ous abor- tions. Ichthyosis in distant relatives.	FISSURES	NO	NO	NBCIE (11 y)	NBCIE	Ichthyosis. Palmoplantar hyperkeratosis.

Abbreviations

M: male, **F:** female, **d:** days, **m:** months, **y:** years, **TNB:** term newborn, **PTNB:** pre-term newborn, **AWFGA:** adequate weight for gestational age, **LWFGA:** low weight for gestational age, **VD:** vaginal delivery, **CS:** Cesarean section, **BW:** birth weight, **HED:** hypohydrotic ectodermal dysplasia, **W:** weeks, **RDS:** respiratory distress syndrome, **NBCIE:** non-bullous congenital ichthyosiform erythroderma, **LI:** lamellar ichthyosis, **IV:** ichthyosis vulgaris, **CB:** collodion baby

Discussion

The entity called CB is a transient condition of the newborn baby which consists of the presence of a membrane-like wrapping which covers the body surface almost completely¹. It is a rare condition which affects both sexes equally³. As is described in the literature, we have observed a similar distribution in both sexes in our series of cases.

The CB condition involves a compressive membrane adhered to the skin, transparent and shiny, which in most cases covers almost the entire tegument on the newborn, though localized forms have been described¹. This was a characteristic observed in 100% of our cases with different degrees of severity. In one of our patients the membrane was localized only on hands and feet. The membrane generally peels off completely within the first 2 to 4 weeks after birth¹⁻⁵, which also occurred in our cases.

CB may manifest in 3 forms: 1) CB syndrome, which involves a transglutaminase-1 (TGM-1) gene mutation and corresponds to the most frequent phenotype; 2) self-healing CB (SHCB), a further TGM-1 gene mutation which affects the TGase enzyme cis trans isomerization and corresponds to 10% of cases⁴; 3) acral self-healing CB, a different TGM-1 gene mutation⁵.

It is not possible for us to perform genetic tests on our population. However, according to the clinical presentation, we have inferred that 13 of our patients (92.8%) corresponded to the syndromic form and 1 patient (7,14%) presented the acral self-healing form.

Recently, the advances in genetic investigation have provided important data about affected genes, their mutations, types of inheritance and prenatal diagnosis. The genetic base of CB depends on the underlying disease. Most children with diagnosis of CB presents autosomal recessive congenital ichthyosis (ARCI). Six genes have been associated with ARCI: TGM-1, ALOXE3, ALOX12B, ABCA12, NIPAL4 (previously known as ICHTHYIN) and CYP4F22. Mutations in the TGM-1 gene correspond to approximately 40% of ARCI cases. 90% of LIs present mutations in this gene and in the remaining 10%, the ALOX12B and ABCA12 genes are affected, the latter being the cause of the most severe phenotype. NBCIE has been described to present alterations in the TGM-1, ALOXE3, ALOX12B and NIPAL4 genes. The SHCB form presents alterations in the TGM-1 gene which have intrauterine manifestations. This is believed to occur due to the hydrostatic pressure of the amniotic fluid on the fetus, which would inhibit the enzyme action, which in turn would resume its activity after delivery. Other forms involving different mutations in the TGM-1 gene are acral self-healing CB and bathing suit ichthyosis¹²⁻¹⁸.

Among our series of cases, 3 CB patients (21.4%) were premature; one of them resulted in LI and there was no follow-up of the other 2. The literature describes a higher



Photo 2: Patient 2. At birth, translucent membrane and ectropion.

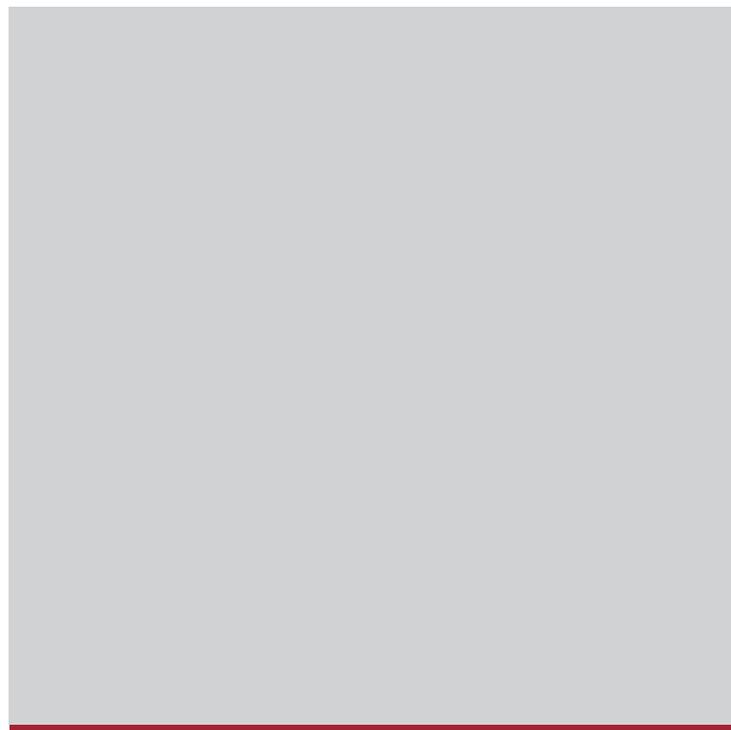


Photo 3: Patient 2. At age 3 years, cutaneous manifestations of LI.

incidence of prematurity in ARCI patients¹². Most children in our series were born to healthy mothers after normal pregnancies.

Regarding the familial antecedents, the 2 HED patients and the 2 patients with ichthyosis had antecedents of the same pathology.

The CB condition is associated with different complications during the neonatal period. The main complications are: hypothermia, dehydration, skin infections, fissures, sepsis, conjunctivitis and mechanical compression of thorax and limbs⁸. Among our cases, 8 patients (57.1%) pre-

LI, NBCIE and phenotypes in between them. 50% of CB cases would correspond to NBCIE and 10% to LI¹. In our series of cases, 8 patients (57.1%) evolved towards some sort of ARCI, which coincides with the literature, but we had a higher percentage of LI: 5 (35.7%) LI against 2 (14.2%) NBCIE. Patient 1 evolved towards a severe ichthyosis which was impossible to define owing to the clinical characteristics of the ARCI type. In our sample, besides the case of ichthyosis, 2 cases presented HED (14.2%), one patient presented acral self-healing CB (7.1%) and 3 patients (21.4%) had no final diagnosis, 2 of them because there was no follow-up and the other one was diagnosed recently and we have not been able to determine the underlying condition to this day.

In a retrospective investigation of 112 patients with ED carried out in 1989, it was confirmed that 70% of 81 children who suffered an X-linked HED presented "collodion", "laminated" or "snake molting" skin at birth. In 1992, Plantin and colleagues issued a publication about the first HED patient born with CB phenotype and suggested this finding could be not that infrequent, but probably underdiagnosed. Therefore, The CB phenotype could be a sign of HED in the neonatal period, which would facilitate its early diagnosis²⁰⁻²².

The evolution of each CB patient is difficult to predict, but the initial severity of the phenotype and the length of time the membrane takes to peel off could indicate severe ichthyoses¹. In a review of 17 patients with CB, the authors did not find any clinical signs which would point out the final diagnosis². In our study, we managed to determine that, out of the 7 patients (50%) with more severe clinical manifestations such as ectropion, eclabion, ear hypoplasia, compression and flexion contracture of hands and feet, most of them corresponded to ARCI, mainly LI (5 patients, or 35.7%).

Skin biopsy is not necessary to reach diagnosis of CB. The underlying condition diagnosis may take a long time¹². It is important for the treatment, prognosis and genetic counseling of the patients and their families to determine the underlying condition as early as possible^{3,5}. In our cases, a deferred skin biopsy was performed on 7 patients after the collodion membrane had peeled off, and another biopsy was done on one patient 4 days after birth. In 7 of the 8 biopsied cases, there was clinical-pathological correlation. In patient 7, the anatomopathological diagnosis differed from the evolutionary diagnosis.

The general treatment of CB involves hospitalization in a Neonatal Intensive Care Unit, isolation, humidified incubator with adequate temperature, hydration, sterile emollients, care and treatment of cutaneous fissures, ophthalmological care and supportive care¹. Systemic retinoids (acitretin) 0,5 - 0,75 mg/kg/day should be considered when the collodion membrane peeling is slow and therefore the risk of infections is higher².

Final prognosis has improved dramatically in the past few years and so has the development of neonatal intensive care units¹.

Photo 4: Patient 4. At 5 days of age, fine membrane which covers the entire body, scarce hair, eyelashes and eyebrows alopecia.



Photo 5: Patient 6. Acral self-healing CB.

sented complications at the neonatal period, namely, suspicion of sepsis and confirmed sepsis, RDS and fissures which proved difficult to treat. Two of the patients who presented RDS and sepsis were premature babies, which made it difficult to determine the real cause of the condition. Most of the patients who presented complications corresponded to the most severe CB phenotypes.

The collodion membrane is the most severe manifestation of different cornification disorders. Most times, it is caused by autosomal recessive congenital ichthyoses (ARCI):

CB mortality has been estimated between 10 and 20%^{1,2}. In our study population, only one patient died at 2 months of age due to sepsis. This represents a mortality rate of 7.1%, in coincidence with the rate described in the literature.

In conclusion, CB is the initial clinical manifestation of different well-defined genetic disorders which need to be identified through familial antecedents and the natural history of the underlying condition²³.

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Photo 6: Patient 11. At 6 days of age, translucent membrane on scalp, peeling off, ear hypoplasia, mild ectropion and flexion contractures of hands.