



## CASE STUDY

### COLLODION BABY AND CHOLESTASIS: A RARE CASE REPORT

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#### ABSTRACT

Collodion baby with cholestasis is an uncommon condition. The term "collodion baby" refers to newborns with thick skin covering their entire body. Neonatal cholestasis is a form of conjugated cholestasis hyperbilirubinemia caused by reduced bile flow. The condition causes persistent jaundice (over two weeks) and elevated conjugated bilirubin. Genetic abnormalities or gene mutations have been reported in neonatal ichthyosis syndrome with cholestasis. A case report of a collodion baby, a rare congenital condition characterized by a parchment-like membrane covering the entire body, was brought to Dr. Soetomo General Academic Hospital. Another finding is prolonged jaundice, which is accompanied by tea-colored urine and acholic stool. A skin biopsy found characteristics consistent with the diagnosis of collodion in a newborn. The pediatric team managed this case, which was treated in collaboration with a dermatologist. This case showed that newborn collodion syndrome required skin care, cholestasis screening, and jaundice management from birth. Further evidence is required to better understand the clinical presentation and effective treatment of this uncommon condition.

**Keywords:** Collodion baby; Cholestasis; Biliary atresia

#### АБСТРАКТ

Коллодийный ребенок с холестазом - редкое состояние. Термин "коллодийный ребенок" относится к новорожденным с толстой кожей, покрывающей все их тело. Неонатальный холестаз - это форма гипербилирубинемии конъюгированного холестаза, вызванная снижением оттока желчи. Это состояние вызывает стойкую желтуху (более двух недель) и повышенный уровень конъюгированного билирубина. Сообщалось о генетических аномалиях или генных мутациях при синдроме неонатального икhtiоза с холестазом. В Главную академическую больницу имени доктора Созотома был доставлен случай ребенка-коллодиона - редкого врожденного заболевания, характеризующегося пергаментоподобной мембраной, покрывающей все тело. Еще одна находка - затяжная желтуха, сопровождающаяся мочой цвета чая и ахоличным стулом. Биопсия кожи выявила признаки, соответствующие диагнозу "коллодий" у новорожденного. Педиатрическая команда вела этот случай, лечение которого проводилось совместно с дерматологом. Этот случай показал, что синдром коллодиона у новорожденных требует ухода за кожей, обследования на холестаз и лечения желтухи с самого рождения. Необходимы дальнейшие данные для лучшего понимания клинической картины и эффективного лечения этого редкого состояния.

**Ключевые слова:** Коллодийный синдром; Холестаз; Билиарная атрезия

## INTRODUCTION

Neonatal cholestasis is a form of conjugated cholestasis hyperbilirubinemia that occurs in newborns due to decreased bile flow.<sup>1</sup> Cholestasis should be suspected in at least 15% of infants with prolonged jaundice (defined as more than two weeks), and serum-conjugated bilirubin testing should be performed.<sup>2,3</sup> When cholestasis is suspected or confirmed in jaundiced infants, a comprehensive prenatal, perinatal, and postnatal medical history and family history should be obtained.<sup>2</sup>

The latest consensus classification of ichthyosis divides it into nonsyndromic skin forms and syndromic organ-specific forms. Lamellar ichthyosis is considered a separate disorder, but patients with moderate clinical features have been reported, and gene mutations can cause both conditions.<sup>4</sup>

## MATERIAL AND METHODS

A male infant, aged two months old, visited Dr. Seotomo General Academic Hospital with the chief complaint of prolong jaundice. The baby also had complaints of peeling and crusted skin with eyelids open outwards since birth. No fever and no vomiting. Urination was tea-colored, and stools were acholic. There were no similar complaints in the family. The patient was born spontaneously, prematurely, at the gestational age of 24 weeks, crying immediately. The patient has consumed breast milk and formula milk since birth. The patient has a complete immunization history. The patient's birth weight is 3100 grams, body length is 47 centimeters, head circumference is 32 centimeters, belly circumference is 36 centimeters, and vital signs are within normal range. The physical examination showed yellowing of the whites of the eyes, a heart murmur, enlargement of the liver, and no enlargement of the spleen. The dermatological examination revealed widespread yellowish hyperkeratosis and excoriation on the entire body. The whole body was covered with a parchment-like membrane, peeling off on the chest and abdomen. Lip eversion, ectropion, flattened nose and ears, claw-like hands, and limited joint movement were all present in the patient. Hair and nails appeared to be normal (Figure 1). The stool color was pale (acholic stool) (Figure 2).



**Figure 1.** Peeling parchment-like membranes cover the patient's chest and abdomen, lip eversion, ectropion, flattened nose and ears, and claw-like hands.

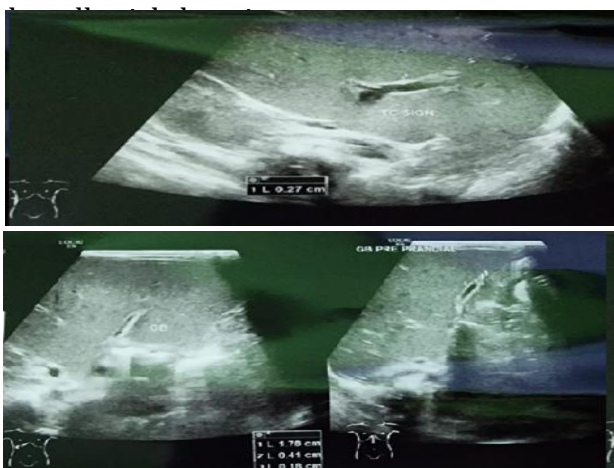


**Figure 2.** Stool color of the patient.

## RESULT

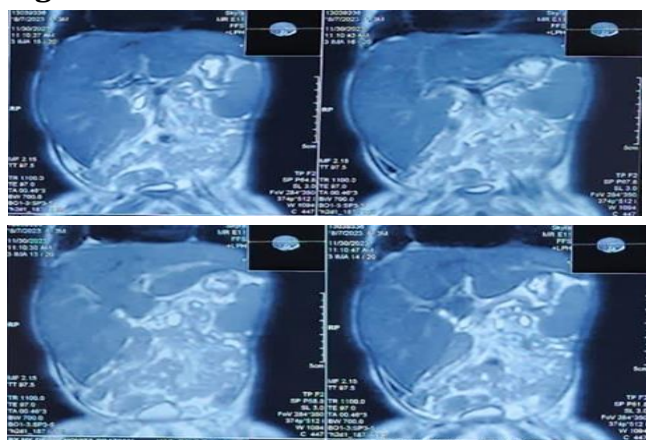
Laboratory examination showed abnormalities in liver function (AST 181 U/L, ALT 104 U/L), GGT (248.4 U/L), ALP 165 U/L, bilirubin (total 6.30 mg/dL; direct 4.40 mg/dL), and albumin (2.43 g/dL). Other laboratory examination showed Hb 14.1 g/dL, Wbc 16.28 x103/ $\mu$ L, Plt 286 x103/ $\mu$ L, PPT 12 sec, APTT 32.2 sec, Na 130 mmol/l, K 5.2 mmol/l, Cl 97 mmol/l, P 2.02 mmol/dl, Ca 8.6 mmol/dl, PCT 0.74 ng/mL, BUN 3,0 mg/dL, creatinine serum 0.3 mg/dL, blood glucose level 76 mg/dL, HbsAg NR 0.17, dan Anti HCV NR 0,08. Blood gas analysis examination showed pH 7.46, PCO<sub>2</sub> 61 mmHg, PO<sub>2</sub> 131 mmHg, HCO<sub>3</sub> 43,4 mmol/l, BE 19,6 mmol/l, TCO<sub>2</sub> mmol/l, SO<sub>2</sub>c 99 %, FiO<sub>2</sub> 21 %. The patient underwent hospitalization. CXR (Chest x-ray) showed cardiomegaly. Echocardiography revealed

Moderate PDA L to R shunt (diameter 3 mm). Two-phase abdominal ultrasound revealed preprandial size +/- 1.78 (length) x 0.41 (width) cm, no wall thickening, no stones/nodules/sludge, and post-prandial GB collapse indicating biliary atresia (Figure 3). Head ultrasound revealed no hydrocephalus, hemorrhage, or specific abnormal lesion in the brain parenchyma. Blood culture showed staphylococcus aureus culture with antibiotic resistance to ampicillin, clindamycin, erythromycin, penicillin G, and tetracycline. MRCP abdomen showed hepatomegaly (Hepar size +/- 10,0 cm (N: < 6,7 cm 0-3 months old) (Figure 4). Skin biopsy showed



**Figure 3.** Two-phase abdominal USG showed abnormalities in gall-bladder contractility, indicating biliary atresia.

**Figure 4.** MRCP abdomen showed



hepatomegaly.

The pediatric team managed this case, which was treated in collaboration with a

dermatologist. Initially, the baby was kept in a moist, neutral-temperature environment. Other supportive therapies, such as intravenous fluids and tube feeding, were administered to maintain hydration and nutrition. Treatment was started with ursodeoxycholic acid, lisinopril, spironolactone, antibiotics, and lipo-soluble vitamins.

## DISCUSSION

Cholestasis is frequently observed as a primary symptom of liver disease in infants. One of the primary diseases that manifests as neonatal cholestasis is biliary atresia, which is the leading cause of chronic liver disease in children. However, its pathophysiology is unknown.<sup>5</sup>

In the early stages, distinguishing biliary atresia from other causes of neonatal cholestasis is challenging.<sup>6</sup> A thorough physical examination is recommended, with a focus on hepatomegaly and/or splenomegaly, dysmorphic features, skin lesions, heart murmurs, growth and development, and nutritional status.<sup>2</sup>

Studies show that biliary atresia can occur in nonsyndromic and syndromic forms. In 84% of cases, biliary atresia is nonsyndromic or isolated (no major malformations present). The other type is syndromic biliary atresia, which occurs when at least one malformation is considered major in 17.6% of cases—meanwhile, 10% of cases involved syndromic biliary atresia with laterality defects. Biliary atresia was most commonly associated with abnormalities of the cardiovascular and gastrointestinal systems.<sup>7</sup>

Collodion babies are usually born prematurely, which increases maternal morbidity and mortality. The neonate is covered by a shiny, taught, transparent membrane at birth.<sup>4</sup> Ichthyosis is characterized by irregular cornification, which results in the formation of a collodion membrane. Lamellar ichthyosis and congenital non-bullous erythroderma are the two most common types of skin disorders that manifest as collodion at birth.<sup>8</sup>

Diagnosing a collodion baby can be done before birth if there is a family history of severe ichthyosis. This can be achieved through fetoscopy and fetal skin biopsy as early as the twentieth week of pregnancy. However, the most reliable prenatal diagnosis can be made from the 10<sup>th</sup> to 12<sup>th</sup> week of pregnancy using genomic PCR examination on material from the chorion villi.<sup>9</sup> Through careful observation, we have found that dermatologic lesions indicate the condition, enabling us to diagnose it through clinical examination. Diagnosing a collodion baby and differentiating it from other conditions primarily relies on clinical observations. In cases of uncertainty, orthokeratotic hyperkeratosis can be definitively diagnosed through a skin biopsy.<sup>9</sup>

In this case, a skin biopsy was obtained supporting lamellar ichthyosis. The skin disorder was present since birth and was followed by prolonged jaundice. Rarely neonatal ichthyosis syndrome with cholestasis is reported. If cholestasis has been identified, the patient should be referred to a specialist as soon as possible, with a liver biopsy or intraoperative cholangiography considered. However, biliary atresia should be excluded with caution based on non-invasive clinical features.<sup>10</sup> Previous study has found that cases of early-onset jaundice, acholic stools, elevated gamma-glutamyl transferase (GGT), and absent or small gallbladder on ultrasonography are more common in the biliary atresia group.<sup>11</sup>

The early and late forms of cholestatic jaundice and fecal acholic are defined before and after two weeks of life, respectively.<sup>12</sup> If conjugated bilirubin is >1 mg/dL (17 mmol/L) and total bilirubin is <5 mg/dL, or >20% if total bilirubin is >5 mg/dL, it confirms cholestasis and needs further evaluation.<sup>2</sup> Every infant with jaundice should have their stool color directly visualized and monitored as part of their clinical evaluation.<sup>2</sup> Infants with jaundice have colored stools initially but may become pale between 2 and 4 months.<sup>13</sup> The presence of acholic stool (97%) had the

highest sensitivity and accuracy in diagnosing biliary atresia.<sup>11</sup>

Based on the clinical assessment and laboratory results, a diagnosis of BA might be indicated. Over the past ten years, there has been significant study into the diagnostic capabilities of fasting abdominal ultrasonography.<sup>2</sup> Ultrasonographic features of biliary atresia, such as gallbladder abnormality, triangular cord sign, and vascular changes, have been reported to be significant predictors of biliary atresia from non-biliary atresia.<sup>14</sup> However, no single radiologic examination appears superior despite some efforts to improve the preoperative examination for biliary atresia.<sup>14</sup> Liver biopsy is a valuable tool for determining the presence or absence of BA. However, cholangiography and surgical exploration are the most reliable methods for diagnosing BA, typically performed together and considered the gold standard.<sup>2</sup>

Intrahepatic cholestasis is diagnosed after extrahepatic biliary obstruction has been ruled out using various imaging modalities and depending on the clinical situation in the healthcare facility.<sup>15</sup> The best predictive parameters in biliary atresia are serum and fecal acholic GGT levels and body weight z-score, which can be performed at the initial evaluation.<sup>8</sup> Several studies have proposed a scoring system based on clinical, laboratory, ultrasonography, and histopathology parameters to avoid unnecessary intraoperative cholangiography in non-biliary atresia patients.<sup>16</sup>

In this case, cholestasis was identified with a direct bilirubin level of 4.4 mg/dl and a total bilirubin level of 6.3 mg/dl, as well as an increase in GGT level of 248.4 U/L (> 200 U/L), which can occur in biliary atresia. Abdominal ultrasonography revealed impaired gallbladder contractility. In this case, cardiac involvement was found, specifically a Moderate PDA L to R shunt, which is a congenital cardiovascular disorder that can accompany biliary atresia.

Previous studies found new genetic abnormalities or gene mutations in neonatal

ichtyosis syndrome with cholestasis.<sup>17</sup> Due to limited facilities, genetic tests were impossible in this clinical case study.

Collodion neonates are at risk for hypernatremic dehydration, hypothermia, and infection if not properly managed. The newborn must be placed in a humidified incubator immediately to reduce TEWL. Effective clinical management requires frequent bathing with water, either with or without mild cleansers, and soft emollients like petrolatum.<sup>18</sup>

Intravenous fluids and tube feeding may be necessary to ensure proper hydration and nutrition. If severe ectropion is present, artificial tears may be necessary. Pain relief measures and mild topical steroids may be considered as part of the treatment plan to help reduce any secondary inflammation.<sup>8</sup>

In addition, medical treatment for biliary atresia involves ursodeoxycholic acid (20 mg per kg/day), which may promote bile flow and drainage. Preventing malnutrition, fat malabsorption, and excessive catabolism requires oral supplements high in fat-soluble vitamins.<sup>19</sup>

One of the most effective treatments for biliary atresia is the Kasai procedure. This surgical technique aims to restore bile flow from the liver to the intestine by directly connecting the two. Infants who have undergone an unsuccessful Kasai procedure for biliary atresia will need to undergo transplantation.<sup>19</sup>

In this case, the infant was initially treated in a humid, neutral-temperature environment. Petrolatum moisturizer was given to the baby. Intravenous fluids and tube feeding were also administered to hydrate and nourish. Antibiotics are prescribed after conducting sensitivity testing to prevent the spreading of infections. In order to increase the flow of bile and drainage, ursodeoxycholic acid was administered. Lisinopril and spironolactone were administered to the patient because it was discovered that the patient had a mild PDA L to R shunt.

Collodion syndrome is uncommon; therefore, it is crucial to establish a comprehensive

treatment protocol that includes appropriate instructions and effective management of potential complications.

## CONCLUSION

Cholestasis in collodion babies is rare. This case showed that collodion infant syndrome requires birth-long skin care, cholestasis screening, and jaundice therapy. Clinicians may lack experience with this rare and varied disease, thus guidelines should be created to handle its dynamic character. More scientific data is needed to understand the clinical state and provide best therapy.

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