

A female infant with phacomatosis pigmentovascularis and congenital chylous ascites

A case report

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Abstract

Rationale: Phacomatosis pigmentovascularis (PPV) is a rare syndrome characterized by capillary malformation and pigmentary nevus. Congenital chylous ascites (CCA) is also a rare disease that results from maldevelopment of the lymphatic system. We report a case of a 5-month-old girl, who had both PPV and CCA.

Patient concerns: A 5-month-old girl is reported, who presented extensive nevus flammeus and an aberrant Mongolian spot with congenital chylous ascites.

Diagnoses: The expression of extensive nevus flammeus and an aberrant Mongolian spot with congenital chylous ascites, that was diagnosed as type IIb phacomatosis pigmentovascularis.

Interventions: Conservative treatment included administration of somatostatin, MCT-based diet or TPN with drainage of ascitic fluid. Surgery was taken into account after failed conservative treatments. Before surgery, it is necessary to locate the abnormal lymphatic vessels.

Outcomes: Conservative treatment and surgery sometimes functioned limitedly on CCA.

Lessons: According to the classification system of ISSVA (the International Society for the Study of Vascular Anomalies), this case meet the classification of CLM included in combined vascular malformations. It is likely to there is a connection between these two congenital diseases.

Abbreviations: CCA = congenital chylous ascites, CLM = capillary-lymphatic malformation, ISSVA = the International Society for the Study of Vascular Anomalies, MCT = medium-chain triglycerides, PPV = phacomatosis pigmentovascularis, TPN = total parenteral nutrition.

Keywords: congenital chylous ascites, nevus flammeus, nevus of Ota, phacomatosis pigmentovascularis

1. Introduction

Phacomatosis pigmentovascularis (PPV) is a rare congenital malformation syndrome which features a combination of dermal melanocytosis and capillary abnormalities.^[1] Chylous ascites is characterized by the accumulation of chyle within the peritoneal cavity. Congenital chylous ascites (CCA) is a rare condition resulting from maldevelopment of the lymphatic system.^[2] Many

pathological conditions can lead to this disease, including thoracic duct dysplasia or obstruction, congenital anomalies of the mesenteric lymphatic trunk or cisterna chyli, malrotation of intestines, incarcerated hernia, intussusception, inflammatory enlargement of lymph nodes, and malignancy.^[3–5] Treatment of CCA is usually conservative and includes fasting, total parenteral nutrition (TPN), medium-chain triglycerides (MCT) diet, and administration of somatostatin. Surgery is reserved for those who do not respond to prolonged conservative treatment.^[6]

Editor: N/A.

The authors report no conflicts of interest.

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Medicine (2018) 97:34(e12012)

Received: 18 April 2018 / Accepted: 30 July 2018

<http://dx.doi.org/10.1097/MD.00000000000012012>

2. Case report

A 5-month-old girl was referred to our department for treatment of chylous ascites. She was born at full-term through vaginal delivery and bottle-fed. Her non-consanguineous parents complained that her abdomen had been presenting with gradual distension since the age of 2 months. She had received intermittent treatment at a local hospital, by receiving TPN and drainage of ascitic fluid, but was not effective. Her body weight was 5.0 kg compared to the birth weight of 3.0 kg. On examination, she presented with intensive ascites that progressed to severe respiratory distress without obvious edema (Fig. 1). Erythema spots (nevus flammeus) were noticed on the chest, upper limbs, hypogastrium, and a large area of the dorsum after birth. Besides these, demarcated grayish-blue

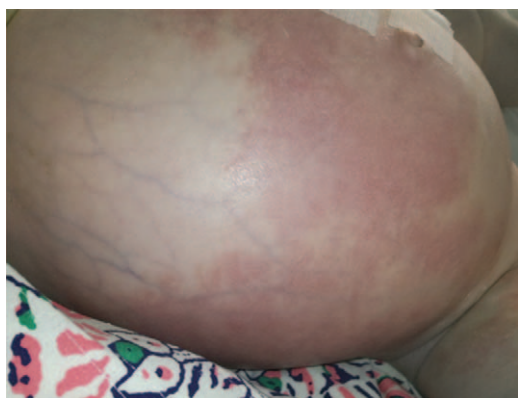


Figure 1. Physical examination suggestive of massive ascites.

hyperpigmentations with clear-cut edges (Mongolian spots) on the back region of the shoulder, dorsum, buttocks, and lower limbs were also noticed (Fig. 2). These lesions were unchanged and asymptomatic since the time of presentation. An ophthalmic examination showed bilateral blue spots on the sclera and conjunctiva (Fig. 3). The extremities were symmetrical, and no hypertrophy and atrophy signs were noticed on soft tissues. Abdominal ultrasonography depicted normal findings other than the presence of massive ascites. To rule out tethered cord, we also performed spinal ultrasonography, which showed that no abnormalities were observed in the spine. A biochemical

examination revealed the following: total protein, 47.5g/L; albumin, 30g/L; and white cell count, 4.5×10^9 cells/L with 12.2% lymphocytes. Abdominal paracentesis was performed immediately when the infant was admitted to hospital and 300 mL of straw-colored fluid was slowly aspirated (Fig. 4). Routine analysis of the peritoneal fluid showed: Rivalta test (\pm); white blood cell count, 2683×10^6 cells/L; mononuclear leucocyte proportion, 90%; multinuclear cell proportion, 10%; and peritoneal fluid culture negative.

After the diagnosis of CCA was made, bottle feeding was stopped. At the beginning of treatment, the patient's nutrition was maintained with oral MCT-based diet. This feeding regimen can fulfill the amount of required calorie intake based on the current body weight. However, it failed to improve the condition and the patient needed repeated paracentesis every 3 to 5 days and about 300 to 500 mL straw-colored fluid was aspirated out every time. The patient was then initiated on somatostatin by continuous intravenous infusion at a rate of $4 \mu\text{g}/\text{kg}/\text{h}$, with a subsequent plan for TPN, if the ascites did not decrease. A peripheral intravenous central catheter was inserted and TPN was started. The weight and the abdominal girth were measured every day. The abdominal girth reduced markedly from 48 cm to 40 cm during 20 days. Then we attempted to return to oral intake; however, ascites rapidly increased again and we performed repeat paracentesis. Furthermore, we completed $^{99\text{m}}\text{Tc}$ -human serum albumin (HAS) intestinal protein losing detection which indicated that there were no obvious signs of intestinal protein losing. Therefore, we highly suspected that the patient had a lymphatic deformity. The patient was referred to the lymphatic specialist for further investigation and treatment. Direct lymphangiography



Figure 2. (A): Erythema spots (nevus flammeus) on the chest, upper limbs, hypogastrium. (B): Demarcated grayish-blue hyperpigmentation with clear cut margins (Mongolian spots) on the lower limbs. (C): Grayish-blue hyperpigmentation (Mongolian spots) and erythema spots (nevus flammeus) on the back region of shoulder, dorsum, and buttocks.



Figure 3. Blue spots on the conjunctiva and sclera.

showed that the trunk of the thoracic duct was obviously dilated, and the terminal structure of the thoracic duct was chaotic. As no contrast agent was found in the blood, thoracic duct exploratory operation was conducted. Dense fibrous adhesions between the ampullary region and Pirogoff angle were found during the procedure and it was believed to result in obstruction of the thoracic duct. After removing the cellulose belt, the chylous fluid flowed from the thoracic duct into the Pirogoff angle. However, abdominal distention, caused by chylous ascites, still remained after surgery. Other unknown abnormalities of the lymphatic system were considered. However, reoperation at this tender age would have presented great risks for our patient. The child was advised to be discharged from the hospital 9 days after surgery and to continue conservative treatment. She was continually



Figure 4. Straw-coloured ascitic fluid collected after abdominal paracentesis.

treated by abdominal cavity aspiration, and low-fat diet feeding, and the infection was controlled at the local hospital. However, she eventually died of severe peritoneal cavity infection, electrolyte imbalance, and severe malnutrition three months after being discharged from the hospital.

3. Discussion

Ota et al first described PPV, which was associated with dermal melanocytosis and congenital vascular nevi, mainly capillary malformation, in 1947. PPV had originally been classified into 4 major types by Hasegawa and Yasuhara.^[7,8] In 2003, PPV type V was described with cutis marmorata telangiectatica congenita associated with aberrant Mongolian spots by Torrelo et al.^[9] Each type was further respectively classified into A and B based on the presence or absence of systemic organs involvement. In 2005, a simplified classification, containing 4 groups, was proposed by Happle using the following descriptions: phacomatosis cesioflamea; phacomatosis spilorosea; phacomatosis cesiomarmorata; and PPV of nonclassifiable type.^[10] Being different from the classification according to Hasegawa, this includes no subdivision between performance with or without systemic involvements. Moreover, as no cases have been reported so far, type I is excluded. Although the pathogenesis of PPV has not been completely understood yet, it is widely believed that abnormality in the development of melanocytic nevus and vasomotor neural cells is derived from the neural crest (Table 1).

The young patient in this study presented with extensive Mongolian spot, nevus flammeus, nevus of Ota, and nevus anemicus, accompanied with CCA. This presentation does fit with type IIB of the traditional categories of PPV. So far, no literature has been reported that CCA is one of the concomitant diseases of PPV.

PPV can be associated with capillary malformation, and chylous ascites can result from congenital anomalies of the lymphatic system and is considered a spectrum of lymphatic malformations. According to the classification system (Approved at the 20th International Society for the Study of Vascular Anomalies [ISSVA] Workshop, Melbourne, April 2014) of tISSVA for vascular anomalies, the child's presentation, including capillary malformation and lymphatic malformation met the classification of capillary-lymphatic malformation (CLM) included in combined vascular malformations. However, the pathogenesis of CLM is still not clear. It may be because of a mesodermal abnormality in early embryonic development.

CCA is a completely rare entity, accounting for about 4% of neonatal ascites, and it is primarily connected with congenital abnormalities of the lymphatic system. Our case most likely resulted from poor chyle resorption because of the obstruction at the ampullary region of the thoracic duct, which is a kind of lymphatic congenital malformation.^[11] CCA is a disease with a severe prognosis. With advancements in medicine, the mortality has decreased substantially, that is from 27% to 30% to 12% to 17%.^[12] In the neonatal period, the most common pathogenesis is the malformation of the lymphatic vessels, atresia or stenosis of the major lacteals, lymphangiomatosis, and mesenteric cysts. The lymphatics obstruction caused by external compression, as in incarcerated hernia, malrotation, intussusception, inflammatory enlargement of the lymph nodes, and malignancy may also lead to chylous ascites.^[13]

Analysis of the ascites obtained from abdominal paracentesis is the most useful diagnostic method. The ascites derived from

Table 1

Classification of phacomatosis pigmentovascularis.

Traditional classification (according to Hasegawa and Torrello) ^[8,9]	New classification (according to Happle) ^[10]	Pattern of nevus
Type I*	(Inexistent)	Nevus flammeus + pigmented linear epidermal nevus
Type II*	Cesioflammea	Nevus flammeus + blue spot ± naevus anaemicus
Type III*	Spilorozea	Nevus flammeus + nevus spilus ± naevus anaemicus
Type IV*	Unclassifiable	Nevus flammeus + dermal melanosis + nevus spilus ± naevus anaemicus
Type V*	Cesio marmorata	Cutis marmorata telangiectatica congenita + blue spot

* A: isolated cutaneous lesion, B: cutaneous and extracutaneous involvement.

chyle, is commonly milky-white or colorless. Probably, owing to treatment with TPN at the local hospital, the infant’s ascitic fluid was straw-colored rather than milky-white.

The appearance of the ascitic fluid is determined by its composition, patient’s diet, and cellular substance. The triglyceride, as well as protein content, is usually high with a predominance of lymphocytes in the differential count.^[14] Despite this, the true difficulty is to find out the potential reason for the chylous ascites. The diagnosis of malformation of the lymphatics should be considered when everything is excluded.

The young patient underwent lymphoscintigraphy, which still remains the “criterion standard” in the visualization of the lymphatic system, for the purpose of identifying the site of the obstruction or leakage.^[15] Massive chylous ascites should be paid more attention and managed appropriately as it is an underlying fatal condition. The available conservative treatment is MCT-based diet or TPN with or without drainage of ascitic fluid. But the success rate of dietetic therapy varies with increased recurrence potential and needs prolonged therapy.^[14] Somatostatin or octreotide, a somatostatin analogue, has been used for treating of chylothorax and chylous ascites caused by various disorders in infants. They are known to decrease the gastric, pancreatic, and intestinal secretions and to reduce the splanchnic blood flow, which may contribute to a decreased lymph flow.^[16,17] Any kind of PPV without systemic involvement has a benign course and needs no treatment. Nonetheless, treatment is often performed because of aesthetic impact, so as to improve the living quality of PPV patients. Lasers, such as intense pulsed light and Q-switched, or a combination of them, help to improve skin pigmented nevi and nevi flammeus. Furthermore, the best time for treatment is before school age to diminish the extension of lesions and the impact on the self-esteem of children.^[18]

4. Conclusions

There is no standard process of diagnosis and treatment for CCA. Conservative treatment includes administration of somatostatin, MCT-based diet, or TPN with or without drainage of ascitic fluid. Surgery should be considered after failure of conservative treatments. Before surgery, it is necessary to locate the abnormal lymphatic vessels.

The simultaneous coexistence of PPV and CCA is extremely rare. According to the classification system of ISSVA, this case met the classification of CLM included in combined vascular malformations. However, it is unknown whether there is an inherent connection between these 2 congenital diseases. Related cases should be paid more attention and timely reported. Further studies should be done to explore the underlying mechanisms.

The parents of the patient have given the informed consent to permit us to use the child’s information and photos.

Author contributions

- Conceptualization:** Ning Sun.
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- Visualization:** Ning Sun.
- Writing – original draft:** Shuai Xu, Ye Zhang.
- Writing – review & editing:** Shuai Xu, Ye Zhang.

References

- [1] Chang BP, Hsu CH, Chen HC, et al. An infant with extensive Mongolian spot, naevus flammeus and cutis marmorata telangiectatica congenita: a unique case of phakomatosis pigmentovascularis. *Br J Dermatol* 2007;156:1068–71.
- [2] Petropoulos AS, Sfougaris DK, Mouravas VK, Gaslem NA. Birth defects of the lymphatic system. *New Developments in Birth Defects Research* Nova Science Publishers, New York:2007;1–67.
- [3] Servelle M. Congenital malformation of the lymphatics of the small intestine. *J Cardiovasc Surg* 1991;32:159–65.
- [4] te Pas AB, vd Ven K, Stokkel MP, et al. Intractable congenital chylous ascites. *Acta Paediatr* 2004;93:1403–5.
- [5] Campisi C, Bellini C, Eretta C, et al. Diagnosis and management of primary chylous ascites. *J Vasc Surg* 2006;43:1244–8.
- [6] Purkait R, Saha A, Tripathy I, et al. Congenital chylous ascites treated successfully with MCT-Based formula and octreotide. *J Indian Assoc Pediatr Surg* 2014;19:175–7.
- [7] Ota N, Kawamura T, Ito N. Phakomatosis pigmentovascularis. *Jpn J Dermatol B* 1947;57:1–3.
- [8] Hasegawa Y, Yasuhara M. Phakomatosis pigmentovascularis type IV a. *Arch Dermatol* 1985;121:651–5.
- [9] Torrello A, Zambrano A, Happle R. Cutis marmorata telangiectatica congenita and extensive Mongolian spots: type V phakomatosis pigmentovascularis. *Br J Dermatol* 2003;148:342–5.
- [10] Happle R. Phakomatosis pigmentovascularis revisited and reclassified. *Arch Dermatol* 2005;141:385–8.
- [11] Huang Y, Xu H. Successful treatment of neonatal idiopathic chylous ascites with total parenteral nutrition and somatostatin. *HK J Paediatr* 2008;13:130–4.
- [12] Bhatia C, Pratap U, Slavik Z. Octreotide therapy: a new horizon in treatment of iatrogenic chylipoeritoneum. *Arch Dis Child* 2001; 85:234–5.
- [13] Kuroiwa M, Toki F, Suzuki M, et al. Successful laparoscopic ligation of the lymphatic trunk for refractory chylous ascites. *J Pediatr Surg* 2007;42:E15–8.
- [14] Romańska-Kita J, Borszewska-Kornacka MK, Dobrzańska A, et al. Congenital chylous ascites. *Pol J Radiol* 2011;76:58–61.
- [15] Karagol B, Zenciroglu A, Gokce S. Therapeutic management of neonatal chylous ascites: report of a case and review of the literature. *Acta Paediatr* 2010;99:1307–10.
- [16] Cardenas A, Chopra S. Chylous ascites. *Am J Gastroenterol* 2002;97: 1896–900.
- [17] Olivieri C, Nanni L, Masini L, et al. Successful management of congenital chylous ascites with early octreotide and total parenteral nutrition in a newborn. *BMJ Case Rep* 2012;2012:
- [18] Kono T, Erçöçen AR, Chan HH, et al. Treatment of phakomatosis pigmentovascularis: a combined multiple laser approach. *Dermatol Surg* 2003;29:642–6.