DOI: https://doi.org/10.4038/sljpm.v6i1.81

Case Report

A case of neonatal purpura fulminans successfully treated, saving life and limb

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Keywords: Neonatal purpura fulminans; Protein C; Protein S; Thrombosis; Amputation

Introduction

Neonatal purpura fulminans is a rare, life-threatening disease characterised by microvascular thrombosis and disseminated intravascular coagulation (DIC) leading to widespread skin necrosis, circulatory collapse and multiorgan failure[1]. It is caused by inherited deficiencies of proteins C or S and infections. Neonatal purpura fulminans is often fatal, with case fatality as high as 50%[2]. Even among survivors, limb amputation is frequently required. Here, we report a Sri Lankan neonate with severe purpura fulminans successfully treated without limb amputation.

Case presentation

A baby girl was admitted to the neonatal intensive care unit 3 hours after birth due to bluish discolouration of both feet (Figure 1). She was born via elective caesarean section at 38 weeks of gestation with a birth weight of 2.725kg as the second child of previously healthy, non-consanguineous Sri Lankan parents. The antenatal period was uncomplicated, and there were no maternal risk factors for sepsis. There was no family history of thrombophilic or bleeding disorders. The baby had cried at birth, and the Apgar scores were 9, 9, and 10 at 1, 5, and 10 minutes, respectively.

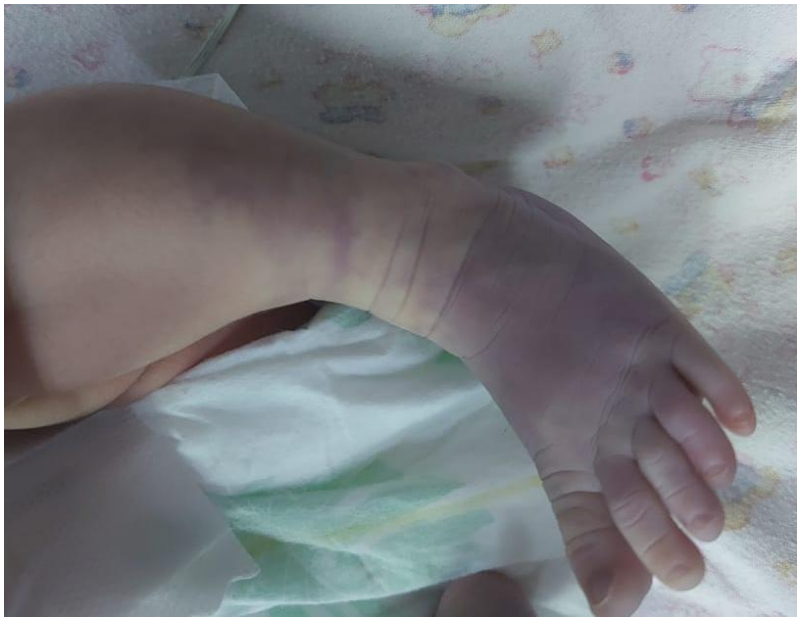

Figure 1- Neonate's foot on admission showing mild bluish discolouration

On examination, the baby was centrally pink and did not have respiratory distress or dysmorphic features. The bluish discolouration was noted in both feet, with evidence of gangrene (Figure 2). Both femoral pulses were palpable, and a grade 2 systolic murmur was heard in the pulmonary area. Her heart rate was 158/min, and the mean arterial pressure was normal (50 mmHg). The oxygen saturation on room air was 88% in both lower limbs and 100% in the right upper limb.

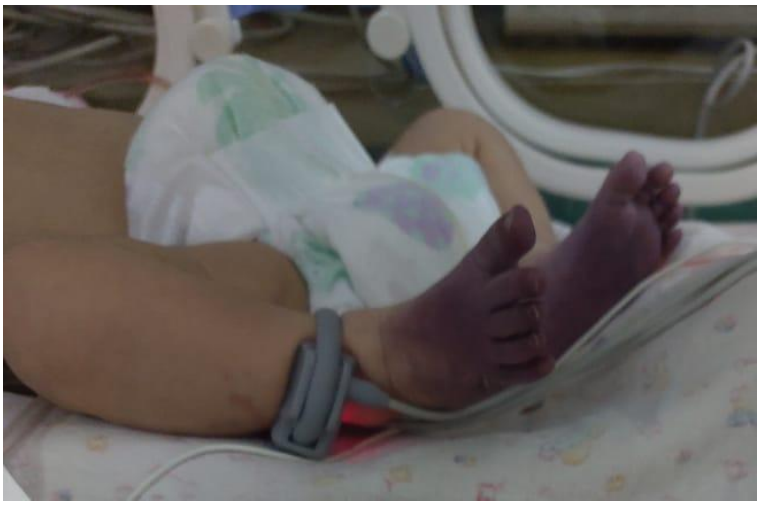

Figure 2- Neonate's feet 3 hours after admission showing extensive discolouration with evidence of gangrene

The initial full blood count showed normal haemoglobin (15.8g/dL), leucocytosis (white blood cell count- 27.7×10^9/L) and thrombocytopenia (platelet count- 77×10^9/L). C-reactive protein was <0.5mg/L. The coagulation profile revealed prothrombin time- 23s (normal 12-16s) and activated partial thromboplastin time- 28s (normal 36-44s). Based on the clinical presentation with lower limb gangrene and thrombocytopenia, a provisional diagnosis of neonatal purpura fulminans was made.

The baby was started on 2L/min nasal prongs oxygen and intravenous penicillin and cefotaxime after obtaining blood for culture. 10 mL/kg platelet-rich plasma, 10 mL/kg fresh frozen plasma (FFP) and 1 unit of cryoprecipitate were transfused. Urgent haematology, vascular surgical, and cardiology referrals were made. Subcutaneous heparin 18 IU/kg was started as the anticoagulant therapy, which was changed to subcutaneous enoxaparin 1 mg/kg twice daily on day two. Intravenous vitamin K 1mg daily was given for five days. FFP transfusions of 10 mL/kg were continued twice daily. Activated protein C concentrates were not available.

The subsequent investigations revealed very high D-dimers (>10,000ng/mL), and the blood picture showed evidence of microangiopathic haemolytic anaemia. Blood cultures were sterile. Doppler studies of both lower limbs, echocardiography and abdominal ultrasonography showed normal results. Protein C and S levels were normal; however, they were done after FFP transfusions.

On day five, the baby developed circulatory failure, fever and tonic-clonic seizures. She was intubated and ventilated and commenced on three inotropes (dopamine, dobutamine and noradrenaline), and the antibiotics regimen was upgraded to intravenous meropenem and vancomycin. Seizures were treated with intravenous phenobarbitone and levetiracetam. Her blood glucose, electrolytes, calcium,

magnesium, electroencephalogram and cranial ultrasonography were normal.

By day ten of life, the baby's condition improved, and the necrotic areas were limited to the superficial aspects of the affected toes (Figure 3). Twice daily FFP administration was continued until day 24, which was thereafter given daily until day 31, every other day for the next four weeks, and weekly until three months. Subcutaneous enoxaparin was tailed off gradually. Surgical amputation was not required, and all affected toes were salvaged except for the distal phalanx of the right third toe, which underwent auto amputation (Figure 4).

At the 3-month review, the baby had normal weight for her age, was developmentally age-appropriate and had well-healed lower limbs. She is awaiting repeat testing for protein C and S levels at six months.

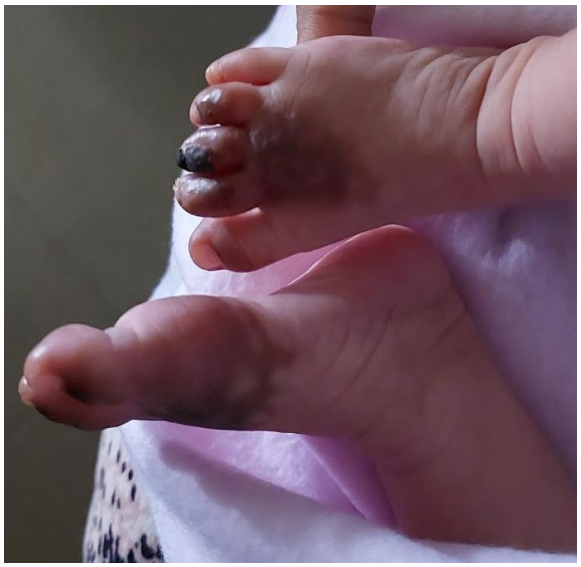

Figure 3 - Baby's feet at day 10 showing necrotic areas limited to the superficial aspects of the right third toe

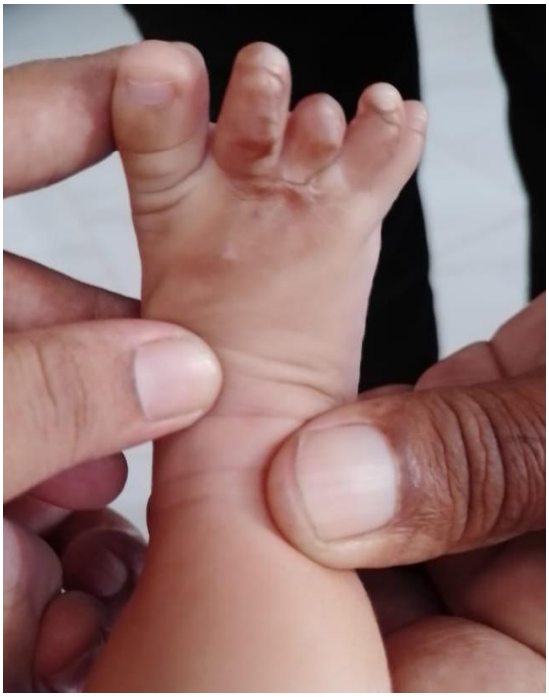

Figure 4 - Baby's feet at three months showing complete healing with auto amputation of the distal phalanx of the right third toe

Discussion

Neonatal purpura fulminans is a severe and fatal condition caused by occlusion of small and medium-sized blood vessels due to microvascular thrombi. It has both inherited and acquired forms. Inherited neonatal purpura fulminans is caused by protein C or protein S deficiency. In contrast, infections leading to consumptive coagulopathy due to DIC coupled with a relative deficiency of protein C is the cause of the acquired form of purpura fulminans[1]. Proteins C and S are synthesised in the liver, and their deficiencies lower the ability to decrease thrombin production, leading to a hypercoagulable state[3].

Inherited neonatal purpura fulminans are due to genetically inherited homozygous or compound heterozygous mutations in the genes encoding protein C or protein S[4]. If a

family history is positive for protein C or S deficiency or there is a history of thrombosis in the family, prenatal diagnosis by chorionic villous sampling is recommended to detect genetic mutations of protein C or protein S. Antenatal diagnosis of protein C deficiency offers significant benefits by providing an opportunity to prevent complications of the disease. The clinician can deliver the neonate early and commence replacement therapy as early as possible[4].

The most identified pathogen causing acquired neonatal purpura fulminans is Group B Streptococcus (GBS)[1]. In addition, it is caused by *Escherichia coli*, varicella, meningococcus, pneumococcus, *Klebsiella oxytoca*, *Neisseria meningitidis* and *Citrobacter*. There was also evidence that *Acinetobacter baumannii* is another potential causative agent[5].

Neonates with purpura fulminans should receive treatment with anticoagulant medications promptly[6]. The mainstay of therapy includes FFP transfusion, anticoagulation and protein C replacement. Even with the optimal management of protein C concentrates, the mortality is high, and a significant proportion of survivors have permanent disability due to limb amputation[7]. A case series of 16 children reported that 69% of survivors required amputation[8].

The most important feature of this case report is that the neonate survived without limb amputation.

She was diagnosed within the first 24 hours of life and was successfully treated, saving life and limb despite being in a resource-limited setting without protein C concentrates. Due to the unavailability of protein C concentrates, the patient was managed only with FFP transfusion, anticoagulation and antibiotics. We believe that the prompt diagnosis and timely treatment with available therapeutic modalities resulted in a near-complete recovery of the baby.

Screening for parents' protein C and S levels did not support a diagnosis of inherited protein C deficiency in our patient. All cultures were sterile; however, c-reactive protein was high during the first week, and the clinical picture suggested a severe infection. Rapid response to upgraded antibiotics supported the presumptive diagnosis of acquired purpura fulminans secondary to severe infection in the neonate.

In conclusion, our case report highlights the importance of the prompt diagnosis of neonatal purpura fulminans to commence early and appropriate treatment. It also shows that neonatal purpura fulminans can be effectively treated with FFP as a replacement for protein C, alongside anticoagulation and an appropriate combination of antibiotics for an extended period. This evidence-based management approach can succeed in low-resource settings, saving lives and not necessitating amputation.

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