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Symmetrical Peripheral Gangrene: An Unusual Occurrence in a 1-Month Old-A Case Report

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ABSTRACT

INTRODUCTION: Symmetrical peripheral gangrene (SPG) is a disfiguring vascular disorder described as symmetrical distal ischemic damage leading to gangrene of two or more sites in the absence of large vessel obstruction or vasculitis. Although it tends to occur in all age groups, the youngest recorded age to our knowledge is 3.5 months. The etiologies are many and have been grouped into infectious and non-infectious causes. Bacteria and viruses such as Staphyloccocus aureus and HIV and low flow states, as seen in hypovolemic shock for example, have been implicated.

CASE PRESENTATION: The case we describe is a 4-week-old, HIV-exposed, small for age (SGA)preterm female who presented with passage of mucoid stool, non-projectile vomiting and continuous fever. At presentation, she was in respiratory distress and was febrile, and appeared pale with features of moderate dehydration. She had hepatomegaly and hypoactive bowel sounds. Blood culture yielded moderate growth of Staphylococcus aureus. Appropriate antibiotics were commenced. Within 20 hours of admission, she developed dry gangrene which started as bluish discoloration of the right hand progressing to the lower third of the forearm, and within a few hours her left hand and subsequently both feet were involved. Her clinical condition further deteriorated at which point she was noticed to have progressive hypoxia and a small volume pulse despite all interventions. She died before planned amputation.

DISCUSSION: This case report underscores the possibility of SPG in neonates despite its rarity and the need for clinicians to have high index of suspicion.

Keywords: Symmetrical Peripheral Pangrene; Neonate; Immunosuppression; Staphylococcus Aureus; Case Report

INTRODUCTION

Symmetrical peripheral gangrene (SPG) is a well-documented, disfiguring vascular disorder complicating diverse medical conditions. It has been described as symmetrical distal ischemic damage leading to gangrene of two or more sites in the absence of large vessel obstruction or vasculitis [1-3]. The exact incidence is not known and patients of any age can be affected [1]. However, the disease remains even more rare in children and the youngest age recorded to our knowledge is 3.5 months [5,6].

The etiologies of SPG are many and could be grouped into infectious and non-infectious causes [1]. The infectious causes include bacteria (Streptococcus pneumonia, Staphylococcus aureus, Neisseria meningitides, Streptococcus pyogenes, Enterococcus faecalis), protozoans (Plasmodium fulciparum), and viruses (HIV, Rubeola virus, and Varicella zoster virus). Non-infectious causes include cardiovascular pathologies (hypertension, heart failure, myocardial infarction, hypovolemic shock, supraventricular tachycardia, pulmonary embolism), drugs (dopamine, adrenaline, noradrenaline), malignancy (acute lymphoblastic leukemia, Hodgkin's lymphoma), connective tissue disorders (systemic lupus erythematosus, antiphospholipid antibodies, polymyalgia rheumatic, progressive systemic sclerosis, Henoch-Schonlein purpura, Takayasu arteritis), miscellaneous (dog bites, appendicitis, extra corporeal shock wave lithotripsy, suprapubic prostatectomy, cholecystectomy, sickle cell disease, hyperosmolar coma, hypernatremic dehydration), protein C or S or antithrombin III deficiency [1,7-17].

Though many pathophysiological agents have been implicated,

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the exact mechanism by which they cause vascular occlusion is largely unknown [1]. Low flow state or septicemia are almost invariably present. Fever followed by marked coldness, pallor, cyanosis, pain, restricted mobility of extremity should always raise suspicion of SPG [18]. The investigations to determine the etiology may not be able to identify the exact cause, but the clinical presentation and the suspected etiologies should guide the choice of investigations. SPG is associated with high rates of morbidity and mortality. Amputation rates reported range from 30 to 50% and mortality has been shown to be as high as 40% [13,19,20].

We present a case that is particularly notable for the very young age of the patient and the rarity of the condition. This patient's course highlights the need for clinicians to have a high index of suspicion because early intervention with antibiotics, intravenous fluids, judicious use of inotropes, anticoagulants, and reduction or removal of aggravating factors is essential line of treatment [1].

OUR CASE

A four-week-old female presented to the Children's Emergency Room (CHER) of the Enugu State University Teaching Hospital, Parklane, Enugu, Enugu State, Nigeria, with poor weight gain which started from birth, passage of mucoid stool that began one week prior to presentation, non-projectile vomiting and continuous fever that commenced a day prior to presentation. She was delivered at home at 36-weeks gestational age by a single mother whose antenatal visits were not kept and she had previously been unaware of her HIV-positive status. The pregnancy however was said to be devoid of any adverse event until at 36-weeks gestation when the mother spontaneously ruptured membrane and was delivered of a live female neonate who cried at birth with a birth weight of 2.2kg (9th centile). The child had inadequate nutritional intake from birth as she was not exclusively breastfed and was introduced to pap from birth.

At presentation, she was in respiratory distress and febrile (38.6°C). She was moderately pale with features of moderate dehydration. Her pulse was 142bpm, regular, and full volume. Her respiratory rate was 52 breaths per minute. Her weight was 2.4kg (0.4th centile). She was noted to have hepatomegaly of 4cm and hypoactive bowel sounds.

The admitting diagnosis was sepsis with moderate dehydration on a background of malnutrition. The HIV screening was reactive/positive. A complete blood count showed marked leukocytosis of 23.04 X 10^9/L of which 76% were neutrophils with many band forms; and blood culture demonstrated moderate growth of Staphylococcus aureus sensitive to ceftriaxone, levofloxacin, cefixime and vancomycin. She was commenced on intranasal oxygen, and intravenous ceftriaxone and vancomycin.

About 20-hours into admission, she was noticed to have bluish discoloration of the right hand and her pulse volume was also noted to be reduced. Dopamine was commenced at 5µg/kg/minute and the intravenous fluid volume was readjusted.

A few hours later, the bluish discoloration of the right hand progressed to the lower third of the forearm. At this point, dopamine was discontinued, intravenous metronidazole and vancomycin were added and the child was being worked up for surgery. Within 48-hours both feet up to lower third of the legs and left hand up to the lower third of the forearm were noticed to have been involved [Figure 1]. However, she died before the planned surgical intervention the following day.

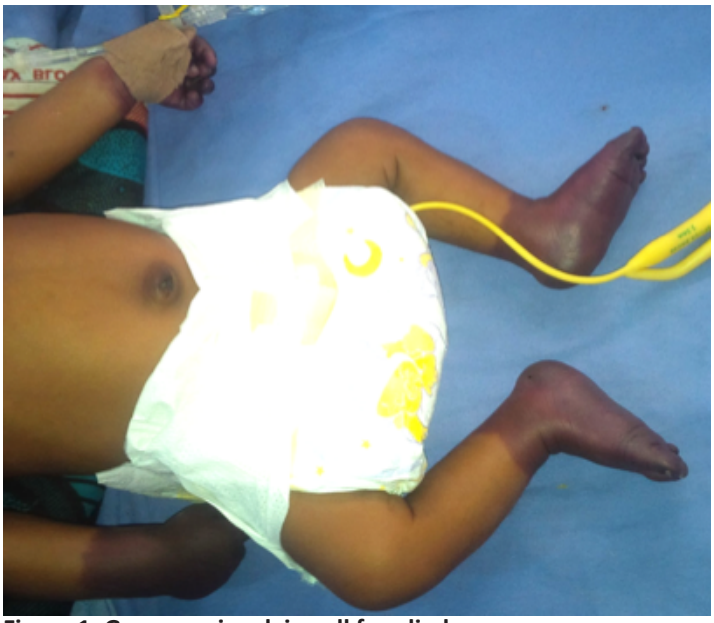

Figure 1: Gangrene involving all four limbs

DISCUSSION

This case describes a neonate with symmetrical peripheral gangrene involving all limbs and her case was striking for the very young age at which it occurred, compared to the youngest case previously recorded in the literature at an age of 3.5 months [5,6].

This patient did have several risk factors associated with SPG. First, an immature immune system is well recognized to be present in neonates, especially preterm infants as in this case. Decreased function of neutrophils and other cells involved in the response to infection has been demonstrated in both term and preterm infants. Preterm infants may also have low concentrations of immunoglobulins. Both preterm and term infants have quantitative and qualitative defects of the complement system [21]. In addition, the underweight and malnourished status of our patient may have also contributed to the immunosuppression.

The relationship between malnutrition and increased susceptibility to and mortality from infectious diseases is well documented in children. Decreased gastric acid secretion promotes bacterial overgrowth and this, coupled with mucosal atrophy and the consequent hypolactasia, cause diarrhea and malabsorption [21,22]. Moreover, there is extensive atrophy of tissues including the thymus, spleen, and other lymphoid tissues, resulting in reduction of circulating lymphocytes. Both humoral and cell-mediated immunity, including lymphokine production, are compromised in malnutrition. While phagocytic function may be normal in such children,

monocyte chemotaxis as well as intracellular killing is depressed. Levels of most components of the complement system are also reduced. Our patient had diarrhea which may be related to the malnutrition, though mucosal atrophy was not demonstrated histologically [22]. HIV infection is also well known for its immunosuppressive effect. HIV has been noted to evade the immune system by causing depletion of certain subset of killer T-Lymphocytes, which further become dysfunctional. Also early in the disease, patients lose HIV-specific CD4+ T-cell responses including the secretion of interferons that normally slow the replication of viruses. PCR was not performed to confirm the diagnosis of HIV in the patient because of her death prior to completion of investigations and treatments.

Our patient's blood culture yielded moderate growth of S. aureus. This is consistent with the several case reports of SPG [29, 6-8,18].

Third, use of dopamine has also been implicated in SPG [10,11]. This may not have been the cause of the SPG in the index case as the gangrene had already started in the first affected limb before it was commenced and it was also quickly discontinued. However, dopamine may have contributed to the rapid progression of the clinical course.

Finally, other possible triggers such as protein C, protein S or antithrombin III deficiency were not assayed, though clinically the baby did not demonstrate any bedside features of bleeding disorder.

CONCLUSION

We recommend that physicians attending to infants should have a high index of suspicion of the early manifestation of SPG once cyanosis of an extremity is noticed. The role of early surgical intervention could play an important role in preventing the mortality associated with SPG.

Consent for publication

Written consent for the report was obtained from the mother.

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