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CASE REPORT

Pseudomonas aeruginosa SEPTIC SHOCK ASSOCIATED WITH ECTHYMA GANGRENOSUM IN AN INFANT WITH AGAMMAGLOBULINEMIA

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SUMMARY

Ecthyma gangrenosum (EG) due to *Pseudomonas aeruginosa* is a rare and invasive infection that can be associated with agammaglobulinemia. The cornerstone of the treatment is based on prompt recognition with appropriate antibiotic coverage and intravenous immunoglobulin. The authors report a case of EG emphasizing the clinical and therapeutic aspects of this condition.

KEYWORDS: Ecthyma gangrenosum*; Pseudomonas aeruginosa*; Agammaglobulinemia, Infant.

INTRODUCTION

Ecthyma Gangrenosum (EG) is a characteristic dermatologic manifestation of severe and invasive infection caused most commonly by *P. aeruginosa*[2]. This disease has been related to life-threatening septicemic infections and high mortality[6,7,9]. The most important predisposing factor that can lead to EG is the presence of any kind of immunodeficiency associated with severe neutropenia[1,6,7,14]. One of the major examples of this condition is found in patients with agammaglobulinemia or hypogammaglobulinemia who manifest this association. Once considered unusual, EG has received special attention in the medical literature in recent years[2,3,9,10,14,15]. Herein we describe a case of EG caused by *P. aeruginosa* in an infant, the diagnosis of which lead to the recognition of a previously unknown agammaglobulinemia.

CASE REPORT

A nine-month-old white Brazilian female was admitted to the emergency department after experiencing five days of left otorrhea and two days of a vulvar necrotic lesion. On physical examination, she was well developed with a toxemic appearance, presenting with fever, tachicardia, tachipnea and hypotension. A single vulvar skin lesion was present which began as a pink macule and progressed in hours to a necrotic lesion with scar formation, surrounded by an intense red areola. Other lesions with the same aspect was disseminated on the thoracic region and lower extremities (Fig. 1 and 2). The laboratory findings were: peripheral WBC count 1600 mm^3 of which 0% were neutrophils, 64% were lymphocytes, and 32% were monocytes; hemoglobin 8.5g/dL and platelets 243 x 10^3/L; C-reactive protein was 190 mg/dL; metabolic acidosis, hypokalemia and hyponatremia were also present. The second peripheral WBC count was 22200 mm^3 (23% neutrophils, 61% lymphocytes, 6% eosinophils and 10% monocytes).

She was transferred to the Pediatric Intensive Care Unit (PICU) and in the first eight hours she needed high doses of norepinephrine (up to 3 mcg/kg/min) and was intubated for mechanical ventilatory support. The antibiotic treatment was initiated with intravenous imipenem, amikacin and clindamycin. During the second PICU day, the infant underwent surgical debridement of the necrotic lesion (Fig. 3), and due to the severe evolution and marked neutropenia, a complete workup for immunodeficiency was made in association with the empirical use of human immunoglobulin 400 mg/kg/dose (three days) and filgrastim (GMSF) 5 mcg/kg/dose.

The bone marrow analysis was normal and the HIV virologic test was negative. The serum immunoglobulins were: IgG 36 mg/dL , IgA 9.6 mg/dl, IgM 12.2 mg/dL. Complement components (C_3, C_4, C_{h50}) and oxidative response (nitroblue tetrazolium – NBT) were normal. The number of T-lymphocytes was normal, and the number of circulating B-lymphocytes (CD19, CD20) was less than 1% (measured by flow cytometry).

After the empirical use of immunoglobulin and GMSF, the peripheral WBC count increased to 35800 mm^3 (fourth PICU day) and serum IgG to 443 mg/dL and 696 mg/dL (20th and 30th PICU days, respectively).

Pseudomonas aeruginosa was isolated from two blood samples from the necrotic-pustular skin lesion and from the surgical sample. The infant underwent a second debridement and a plastic surgical correction in the

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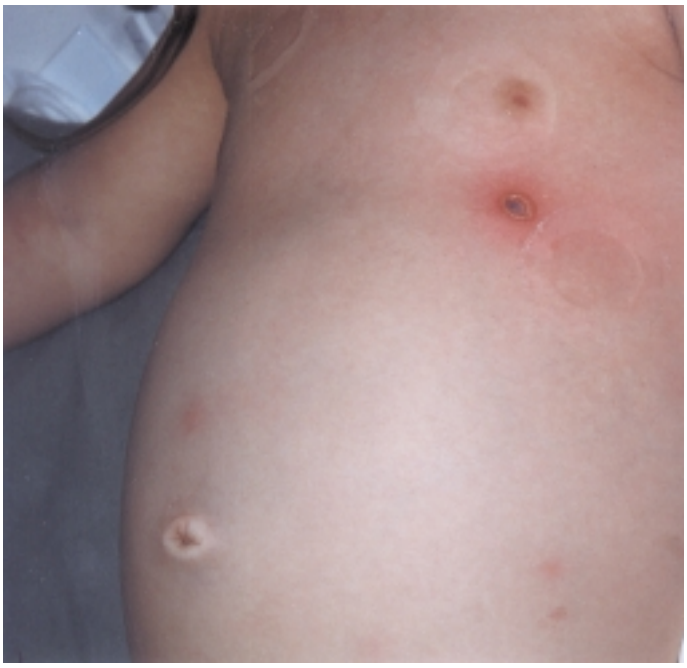

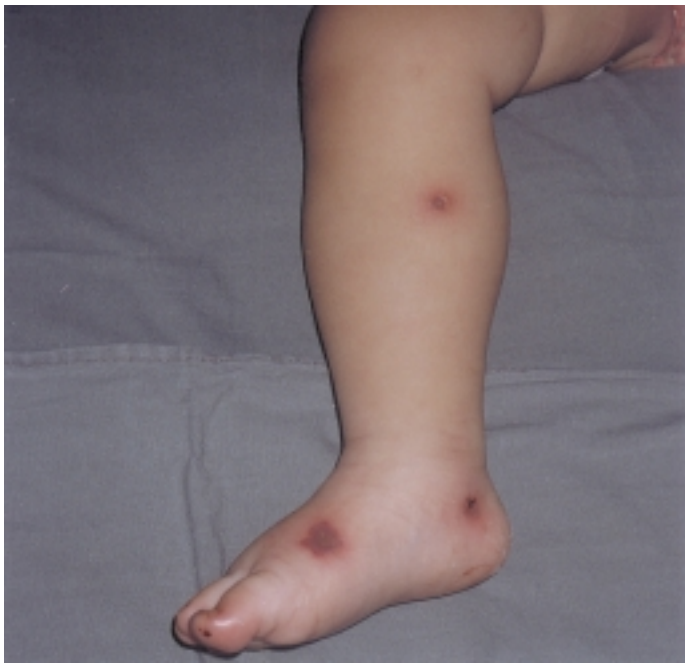

Fig. 1 and 2 - Necrotic lesion on the thoracic region and inferior extremities.

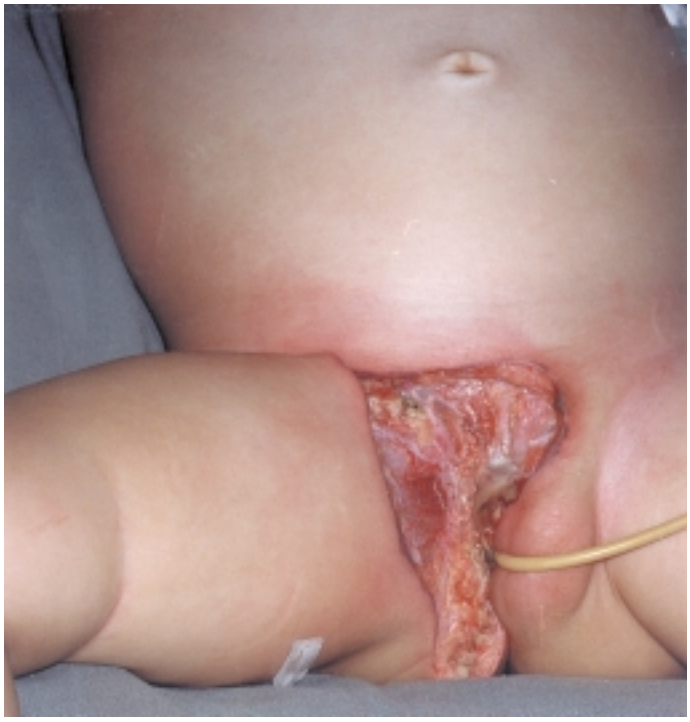

Fig. 3 - Right inguinal aspect after surgical debridement of the necrotic lesion.

perineal region. She was discharged after 40 days receiving intravenous immunoglobulin (400 mg/kg/month) in order to keep IgG > 500 mg/dl and normal lymphocytes count.

DISCUSSION

Pseudomonas aeruginosa generally causes infection in patients with immunodeficiency conditions[2]. Hence, the presence of *P. aeruginosa* infection in healthy and out-of-hospital children (that was presumably our patient's situation on admission) is very uncommon.

One manifestation considered by some authors as characteristic of *P. aeruginosa* septicemia is the skin lesion called ecthyma gangrenosum (EG). This lesion represents a formidable skin sign of a potentially life-threatening systemic infection, and it is commonly caused by *P. aeruginosa*. The characteristic clinical appearance is red maculae that progress to a hemorrhagic bluish bullae that rupture to form a central area of necrosis surrounded by an erythematous halo. The main site of EG lesions is the gluteal or perineal region (57%), although this lesion can spread to other body sites as occurred in our patient, in which metastatic lesions appeared on both trunk and lower extremities. One major clinical feature in almost all patients is the presence of neutropenia. In two retrospective studies, all the patients with EG were immuno-compromised leading to severe neutropenia, and the absolute neutrophil count of less than 500/mm^3 were strongly related to the clinical outcome[4,6,7,11,12].

In our patient, the diagnosis of agammaglobulinemia was confirmed by her extremely low concentration of all the immunoglobulin isotypes, profound decrease in circulating B-lymphocytes, normal lymphocyte count and normal cell-mediated immunity, complement, and phagocytosis. In agammaglobulinemia, the presenting infection is sepsis (10%), and half of these cases are caused by *Pseudomonas* species[8]. In our hospital, five of nine patients had sepsis as the initial manifestation of the disease, and 60% were caused by *Pseudomonas*[5].

The association of these four components: sepsis, EG, *P. aeruginosa*, and agammaglobulinemia was first described by SPEIRS *et al*. in 1963 and other authors have also described this rare condition[3,9,10,13,14,15]. To decrease the mortality of this condition, the treatment should include prompt recognition of the skin lesion, appropriate antibiotic coverage, and surgical debridement. Another therapeutic intervention in our case was the empirical use of intravenous immunoglobulin, and its use in this case might be related to the positive outcome of our patient. This successful empirical intervention has been previously reported in children[9].

With these considerations, we conclude that physicians must be aware of these conditions and consider EG as a likely diagnosis when facing a previously healthy septic infant with skin lesions such as those described above. In this situation, prompt debridement, and initiation of antibiotics with appropriate coverage against *Pseudomonas* sp. should be initiated. If the infant is also neutropenic, an underlying immunodeficiency should be investigated and empirical therapy with IV immunoglobulin should be started based on the increased likelihood of an underlying agammaglobulinemia in patients who present such an association.

RESUMO

Choque séptico por *Pseudomonas aeruginosa* associado a éctima gangrenosa em criança com agamaglobulinemia

Éctima Gangrenosa (EG) por *Pseudomonas aeruginosa* é uma infecção rara e invasiva que pode ser associada com agamaglobulinemia. O tratamento fundamental é baseado no pronto reconhecimento com cobertura de antibiótico apropriada e imunoglobulina intravenosa. Os autores relatam caso de EG dando ênfase aos aspectos clínicos e terapêuticos desta condição.

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