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Coexistence of cellulitis and primary peritonitis in a pediatric patient with nephrotic syndrome: A case report

Luisa Lagos [a, *], Juan Valero [b, c]

[a] Universidad del Rosario, Colombia
[b] Universidad Nacional de Colombia, Colombia
[c] Fundación Hospital de la Misericordia, Colombia

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ABSTRACT

Nephrotic syndrome is a chronic disease that increases the risk of skin, respiratory and urinary tract infection, while also increasing the chance for other diseases, like peritonitis and meningitis. A four year old patient with a history of nephrotic syndrome was admitted to emergency room (ER) with the following symptoms: abdominal pain, fever, diarrhea and vomiting, associated to abdominal wall erythema, abdominal distension and peritoneal signs. In order to make a differential diagnosis of the infection, peritoneal fluid was extracted and, according to the characteristics found, treatment with broad-spectrum antibiotics was started. Cases in which different infections like pneumonia, abdominal wall peritonitis and cellulitis occur simultaneously have been reported rarely. Early diagnosis and dismissal of other causes of acute abdominal pain, as well as early introduction of antibiotics are fundamental in the treatment of these kind of infections.

1. Introduction

Complications of Nephrotic Syndrome (NS) can arise as part of the disease or as a consequence of the treatment employed by physicians. In developing countries infection is the main complication associated with NS[1], usually developing in an episode of nephrotic disease, or inducing a relapse in a child in remission [2]. In childhood, NS shows an incidence of 2–4 cases per 100000[1], with a high mortality rate as a consequence of infection. It is estimated that about 1.5% of pediatric cases result in death as a consequence of superadded infection related to their underlying pathology [3].

The occurrence of different forms of infection have been reported in conjunction with NS. These infections include: superior respiratory tract, urinary tract, skin infection, severe infection like pulmonary tuberculosis, meningitis and peritonitis. These infections often lead to rapid sepsis and may compromise the patient's life [2]. Co-occurrence of different types of infection is very uncommon [2].

2. Case presentation

A 4 year old male was admitted to the hospital with a 3-day history of decreased urine output and a twelve-hour history of lower limb and scrotal edema. These symptoms were associated with fever, diarrhea, vomiting and abdominal pain around the iliac fossa, that later radiated to the lumbar region. The patient was diagnosed with corticosensitive nephrotic syndrome around the age of a year and a half at another institution, where he received treatment with Prednisolone for 3 weeks prior to medical appointment (33 mg/m2/day). He also experienced 5 relapses of NS during this time. On admission, the patient presented a regular general condition with dehydration, tachycardia, abdominal distension and pain, peritoneal irritation and erythema in the abdominal wall and scrotum (Fig. 1). Paraclinical tests revealed significant Leukocytosis and Neutrophilia (Total leukocytes 34.170/mm^3, neutrophils 87%), elevated acute phase reactant (CPR 76 mg/L and procalcitonin 26,72 ng/mL), impaired renal function (BUN: 29,8 mg/dL and creatinine: 0,39 mg/dL), albumin: 0,9 mg/dL, total cholesterol: 467 mg/dL and triglycerids: 309 mg/dL. Thorax radiography showed retrocardiac opacity and obliteration of the left costophrenic sulcus.

He was treated with a daily dosage of 60 mg/m2 of prednisolone and administration of crystalline penicillin was initiated due to

* Corresponding author.
E-mail address: luisalagos19@gmail.com (L. Lagos).

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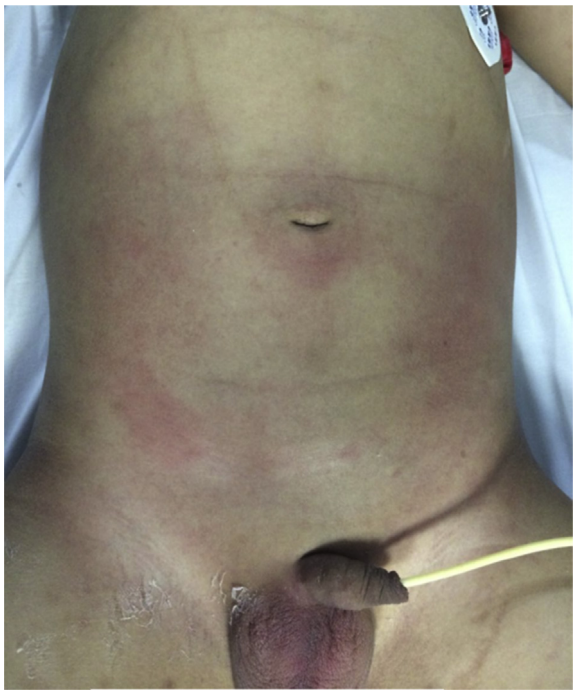

Fig. 1. Diffused erythema of the abdominal wall.

Fig. 2. Milky peritoneal fluid extracted from patient.

evidence of pneumonia. The patient was evaluated by the Pediatric Surgery Department, suggesting primary peritonitis associated with abdominal wall cellulitis, and secondary peritonitis as a differential diagnosis. Given the importance of responsible microorganism differentiation in order to administer adequate antibiotic treatment, the patient had to be sedated and paracentesis was performed. Milky fluid, characteristic of primary peritonitis, was extracted (Fig. 2). Gram stain of peritoneal fluid reported a large number of polymorphonuclear leukocytes without presence of bacteria. No bacterial growth was observed in the peritoneal fluid or blood cultures. After diagnosis was updated, treatment was changed to Ceftriaxone and Clindamycin for 10 days and Prednisolone administration was continued on the same dosage. Albumin infusion and diuretic stimulation with furosemide were also administered. On the tenth day of hospitalization, after the patient showed improvement (blood pressure percentile less than 90 and high toleration to oral administration) diuretic stimulation was removed and the patient was discharged on ambulatory treatment consisting of Prednisolone, Spironolactone, Calcitriol and Calcium Carbonate. He was seen once a month for the next five months, during which time corticotherapy was progressively reduced. No relapses or new episodes of infection presented during those five months.

3. Discussion

Incidence of infection up to 17% has been reported in children with NS, being more frequent in the first 2 years after diagnosis [4]. Bacterial peritonitis is one of the most common infections found. It affects between 1.4% and 3.7% of children, causing death in 9% of total cases [3]. Characteristics that predict the development of peritonitis in children with NS have been identified, revealing an ethnic preference for black males, (male to female relationship 3:2) and predisposition to future episodes of peritonitis based on occurrence of previous episodes [3]. Other factors that also predispose patients to develop peritonitis, as well as cellulitis, are: severe hypoalbuminemia and hypercholesterolemia [5,6], the use of glucocorticoids and cytotoxic agents during treatment [7–9,14,16], the reduction of humoral immunity [7,13], increment of bacterial translocation [4] and physiological factors such as liquid accumulation in cavities, which usually serve as culture medium.

Clinically, primary peritonitis is associated to abdominal pain in 98% of cases. Fever, nausea, vomiting and signs of peritoneal irritation are present in 85% of cases. Patients report a pain so intense that it is first categorized as acute abdominal pain with consideration for surgery [4]. Presence of erythema in the abdominal wall may be a sign of contiguous spread of abdominal infection, in both primary and secondary peritonitis. Nevertheless, prior to any intervention, diagnostic paracentesis and biochemical and microbiological studies are always recommended and should always be performed first during the treatment of these pathologies, as they allow physicians to guide antibiotic treatment. In most cases, bacteria is not isolated during peritoneal fluid cultures, so blood cultures are recommended too. Most types of peritonitis are caused by Gram positive bacteria, particularly S. pneumoniae, though in the last few decades the involvement of Gram negative bacteria, such as *E. coli*, have also been reported [6]. Most guides recommend treatment with aminoglycosides and/or third generation cephalosporins [4,7,10,11,15]. Invasive procedures, such as laparotomy and laparoscopy have also been implemented but their use is controversial. Some authors recommend appendectomy when dealing with primary peritonitis, while others speak against removing healthy organs. Nevertheless, peritoneal washing during laparoscopic surgery is sometimes recommended, as it has been shown to reduce bacterial load [12].

Not many cases of skin infection, as a complication derived from NS, have been reported. In India, Senguttuvan et al. found that 11 out of 260 (4.2%) cases were admitted with skin infections, and 3 cases of cellulitis showed growth of Gram negative bacteria in secretion cultures. However, no data regarding focus of infection was found [3]. In China, 97 out of 508 cases of NS were associated with infection and out of those 97 about 5% were classified as

cellulitis [9]. Additionally, previous records show an increase in infections caused by encapsulated skin bacteria. In these cases, treatment with aminoglycosides and/or third generation cephalosporins is appropriate [1]. In children, the co-occurrence of clinical and paraclinical symptoms of peritonitis, associated to abdominal wall erythema, still constitute a challenge. The reason for this being that cases corresponding to this scenario are mainly owing to intraabdominal catastrophe with secondary perotinitis due to ruptured gut [17,18] or a necrotizing infection of soft tissue [19].

The presence of two and even three simultaneous infections in the same patient, specifically related to primary peritonitis and cellulitis, has been reported just once in an isolated case. However, the case referred to only compromised periumbilical area due to cellulitis and not the complete anterior abdominal wall and scrotum, as in our case study [14].

4. Conclusions

Despite of introduction of glucocorticoids and antibiotics in the treatment of NS and its associated complications, mortality rate linked to this disease keeps drawing attention. It is vital to make an adequate diagnosis in children and take into account any underlying factors. Moreover, prior to any surgical intervention in children with primary peritonitis and abdominal wall erythema, it is crucial to perform paracentesis and examine the characteristics of fluid extracted. This can help shape initial therapy and improve the prognosis of patients.

Appendix A. Supplementary data

Supplementary data related to this article can be found at http://dx.doi.org/10.1016/j.epsc.2016.11.017.

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