Case study

Staphylococcal Epidermolysis: a Case Report

ABSTRACT

Acute staphylococcal epidermolysis, also known as staphylococcal scalded skin syndrome (SSSS), in young children is caused by the release of exfoliative toxins A and B (ETA and/or ETB) from an initial outbreak which can be ear-nose-throat, conjunctival or cutaneous.

Staphylococcal scalded skin syndrome is characterized by painful erythroderma, quickly followed by generalized detachment with respect to mucous surfaces, regressing in 2 to 4 days on antibiotics. The positive diagnosis is mainly based on clinical examination and sometimes on skin biopsy.

The course of the disease is benign, favored by anti-staphylococcal treatment combined with local care. However, the risk of fatal course is estimated at around 4% in the event of delay in antibiotic treatment. We report the case of an infant with SSSS, diagnosed and treated early with good evolution.

Keywords: Staphylococcus Aureus- skin, epidermolysis-1, antibiotics

INTRODUCTION

Staphylococcal scalded skin syndrome (SSSS) is a bacterial toxin-mediated skin disorder which occurs when exotoxins produced by Staphylococcus Aureus undergo hematogenous dissemination to the skin. Staphylococcus aureus causes exfoliative dermatitis by secretion of exfoliative toxin A (ETA) and/or exfoliative toxin B (ETB) [1]. ETA and ETB play a role in the cleavage of desmoglein-1, a desmosomal linking protein responsible for keratinocyte-to-keratinocyte adhesion in the stratum granulosum. Hematogenous dissemination of the exotoxins from the initial focus of S. aureus infection stimulates separation of epidermal keratinocytes and detachment of the superficial epidermis [2].

The areas of skin detachment are often found at a distance from the staphylococcal infectious focus (omphalitis, facial impetigo,...), ENT (nasopharyngitis, otitis), or exceptionally from a deep focus [3,4]. ETA and/or ETB would diffuse from the infectious focus, through the bloodstream, to zone where they act on the skin.

Staphylococcal scalded skin syndrome is a rare disease with an incidence of 0.09 to 0.56 cases per million inhabitants [5]. It mainly affects infants and young children before the age of six [3]. The susceptibility of young

children to SSSS is postulated to result from a lack of protective antibodies against staphylococcal toxins and/or insufficient ability of young children's kidneys to excrete the exotoxins [5]. Adult susceptibility appears to occur in the presence of impaired immunity, impaired renal function, or serious illness. Adult disease is often associated with a high burden of staphylococci.

The diagnosis of SSSS is essentially clinical [1]. It is characterized by progressive, cutaneous erythema and desquamation and constitutional symptoms (Figure 1). Mucous membrane involvement is absent. The earliest cutaneous signs of SSSS are macular erythema and skin pain. Initially, erythema is accentuated in the skin folds, such as the neck, axillae, inguinal folds, and gluteal cleft. The erythema may be subtle, can wax and wane, and may be especially difficult to appreciate in patients with highly pigmented skin. Generalized erythema usually develops within 48 hours.

As the disease progresses, flaccid bullae begin to appear in areas of skin erythema, resulting in a wrinkled appearance. Shallow erosions may also occur in sites subject to friction, such as in the perianal region. Even minor insults, such as placement of a blood pressure cuff or removal of adhesive tape, may lead to erosions. Sheet-like, superficial desquamation can develop, leaving large patches of moist, erythematous, shiny skin.

Thick crusting and radial fissuring often develops around the mouth, nose, and eyes (Figure 2). The crusting, fissuring, and associated erythema can be striking and is classically referred to as SSSS "sad face." The perioral crusting has been likened to dried oatmeal in its appearance.

Common prodromal and concurrent symptoms include skin pain, fever, irritability, malaise, and poor feeding. As a result of the compromised skin barrier in SSSS, patients can also exhibit signs and symptoms related to significant fluid loss and temperature instability.

The site of staphylococcal infection often is not evident [6]. Findings suggestive of infection include purulent drainage at the conjunctivae and medial canthi of the eyes in conjunctivitis; impetigo-associated, honey-colored crusting of the nares, perinasal skin, or perioral skin; perianal erythema; and pustules or other crusted areas on the skin. In newborns, staphylococcal infection may appear as erosions, purulence, or crusting surrounding the umbilical stump or a recent circumcision site [7].

The management is based on the treatment of the infectious focus. Intravenous anti-staphylococcal antibiotic treatment combined with good hydration, painkillers and local treatments, quickly leads to recovery without sequelae.

CASE REPORT

A nine-month-old infant was referred to our unit for a generalized rash characterized by erythema, associated with superficial peeling of the skin with scaling lesions, and oozing (Figure 3). The infant, with no particular medical history, had not taken any drugs or toxic substances in the previous days. He had no history of allergies and was up to date on vaccinations. The rash had started four days earlier in the perioral region and neck, then spread over to 70% of the body surface. Everything evolved in a context of pyrexia at 38.7°C. The clinical examination revealed erythroderma with yellowish oozes (face, neck, nostrils and external auditory canals),

desquamative lesions on the back (Figure 4) chest, limbs and external genitalia, (Figure 5) mucous membranes were healthy. The infant was irritable. The diagnosis of SSSS was made clinically.

A biological assessment demonstrated an increase in CRP to 88 mg/l (standard: 0-10 mg/l) associated with hyperleukocytosis at 28.95 $10^3/mm^3$, predominantly neutrophilic at 14.23 $10^3/mm^3$ (standard: 2.0-7.7 $10^3/mm^3$).

The patient was started on intravenous Oxacillin combined with hydration measures and local care.

A sample for bacteriological study of the lesions revealed a staphylococcus aureus sensitive to oxacillin, our patient improved on day 4 of treatment (Figure 6) and the follow-up treatment consistent of oral doses, for six days. The evolution was favorable (Figure 7)

DISCUSSION

Staphylococcal scalded skin syndrome is caused by certain strains of S. aureus secreting exfoliating toxins A and B with proteolytic activity responsible for the cleavage of desmoglein 1 [4]. Desmoglein-1 is a desmosomal cadherin found in the upper epidermis but not in the mucous membrane. Hydrolysis of the amino-terminal extracellular domain of desmoglein-1 by exfoliative staphylococcal toxins ETA and ETB results in disruption of the adhesion of keratinocytes in the stratum granulosum, resulting in bubble formation and subsequent diffuse desquamation [6] . From the infectious focus, located at a distance from areas of skin detachment, ETA and/or ETB diffuse by the hematogenous route to act on the skin [8]. The mucous membranes are usually spared [1].

The child with SSSS has a scalded appearance and exposes large red areas covered with skin shreds. Faced with this clinical picture, the differential diagnosis arises mainly with toxic epidermal necrolysis (NET) composed of Lyell and Stevens-Johnson syndrome. The name Lyell syndrome is used for the most extensive forms (> 30% of the body surface) and that of Steven-Johnson syndrome for the limited forms of epidermal necrolysis (<10% of the body surface) [9]. This distinction is however very theoretical, a Stevens-Johnson syndrome being able, in a few hours, to progress to a Lyell syndrome. These differ from the SSSS by several characteristics.

- Involvement of the mucous membranes is usual [9]. Histopathology shows epidermal necrosis of the entire thickness of the keratinocytes [8] and not only at the level of the stratum granulosum. The cleavage occurs in fact at the dermal-epidermal junction [4].
- A history of drug use is demonstrated during the history (immunological reaction to a drug) [10].
- The disease occurs at any age. It is a life-threatening emergency, the prognosis is severe: 20-25% mortality [9].

If the diagnosis is not clinically obvious, a skin biopsy can differentiate these two pathologies [10]. PCR detecting staphylococcal toxins can also aid in the diagnosis [11].

Among other differential diagnoses, generalized bullous impetigo is also caused by exfoliative staph toxins. Unlike SSSS where the bullous content is sterile because the toxins are spread hematogenously [12], in bullous impetigo, these toxins diffuse locally and S. aureus can be identified by swabbing a bubble. Clinically, the

bubble is clearly demarcated with no surrounding or generalized erythema and Nikolski's sign is typically negative [6].

Intravenous treatment with an antistaphylococcal antibiotic should begin promptly. Patients are typically initially treated with a penicillinase-resistant penicillin, methycillin, such as oxacillin or nafcillin. Alternatives include a first- or second-generation cephalosporin or vancomycin.

Clindamycin has antistaphylococcal activity but is not recommended as a primary treatment because of high rates of clindamycin resistance in SSSS [13]. Although some clinicians routinely add clindamycin as an adjunct to a penicillinase-resistant penicillin or cephalosporin based upon the theory that clindamycin may decrease ribosomal production of the pathogenic staphylococcal exotoxins, evidence to support superior efficacy of this practice is lacking [13,14,15]. We do not typically add clindamycin to standard antibiotic therapy. We occasionally add clindamycin in the setting of a severely ill patient.

Common initial intravenous antibiotic regimens for children with SSSS associated with a skin or soft tissue infection are listed below. Most SSSS isolates in children are susceptible to oxacillin or nafcillin:

- Intravenous nafcillin or oxacillin: 100 to 150 mg/kg per day in divided doses every six hours; maximum daily dose of 12 g per day. Weight-based dosing for neonates differs and is reviewed separately.
- Intravenous cefazolin: 50 to 100 mg/kg per day in divided doses every eight hours; usual maximum daily dose of 6 g.
- Intravenous vancomycin: 45 mg/kg per day in divided doses every eight hours; usual maximum daily dose of 2 g. Weight-based dosing for neonates differs and is reviewed separately.

Initial antibiotic selection should be adjusted based upon antimicrobial susceptibility of isolates. In addition, antibiotic selection and dosing should be appropriately adjusted based upon the underlying infection.

Supportive care is a critical component of management. Adequate hydration should be ensured, and trauma to the skin should be minimized:

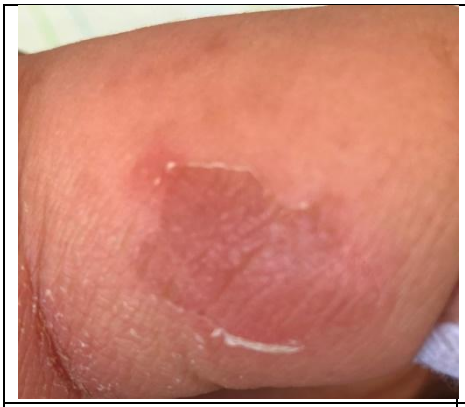
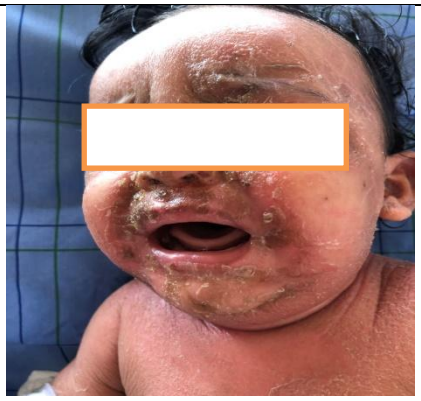
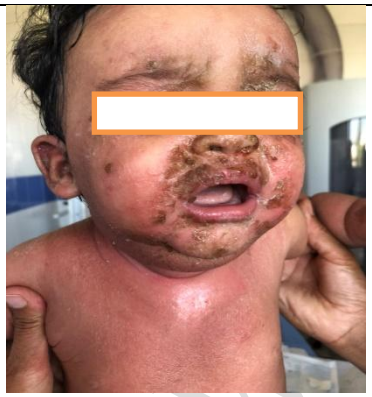
Then, depending on the response to treatment, antibiotic therapy may be substituted by the oral route [6]. In our patient's case, the antibiogram showed sensitivity of Staphylococcus aureus to oxacillin.

Finally, if no improvement is observed with the antibiotics, the intravenous injection of immunoglobulins for five days (0.4 g/kg/day) or of fresh frozen plasma from an adult (10 ml/kg) had been shown to be effective in children with SSSS. The theory is based on the fact that 91% of adults over 40 produce antibodies that can neutralize the exfoliating toxins of S. aureus responsible for SSSS [5,16]..

CONCLUSION

The initial management of SSSS typically involves hospitalization of the patient, intravenous antibiotic therapy, and supportive measures. We suggest intravenous, rather than oral, administration of an antistaphylococcal antibiotic for initial therapy. A penicillinase-resistant penicillin, such as nafcillin or oxacillin,

is usually given as initial therapy. Cephalosporins and vancomycin are alternative treatments. Culture and antibiotic susceptibility testing should be followed to detect the presence of S. aureus strains resistant to the selected therapy. Once clinical improvement occurs, patients may be transitioned to oral antibiotic therapy.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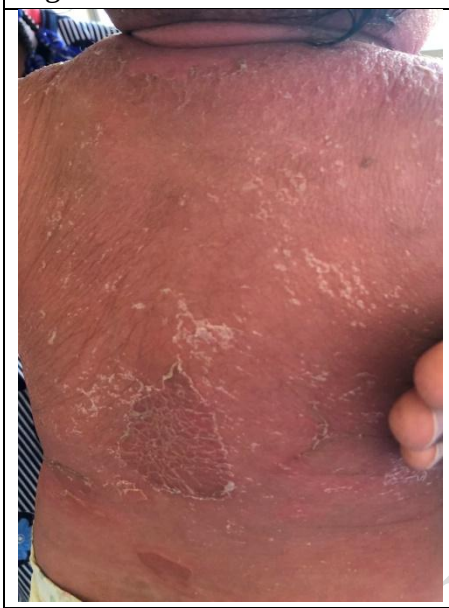		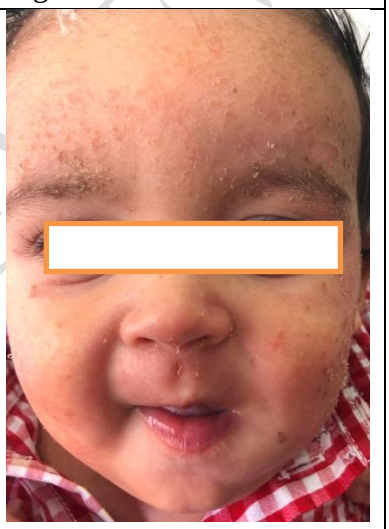
Figure 4	Figure 5	Figure 6
		
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