ejpmr, 2018,5(7), 292-295

SJIF Impact Factor 4.897

EUROPEAN JOURNAL OF PHARMACEUTICAL AND MEDICAL RESEARCH

www.ejpmr.com

Case Study

ISSN 2394-3211

EJPMR

STAPHYLOCOCCAL SCALDED SKIN SYNDROME (SSSS) – A PAEDIATRIC CASE STUDY

Anson Mathew Joseph[1]*, Clinton Baby[2], Muhammed Shafi K.[3] and Soorya Soman[4]

[1,2,3,4]Doctor of Pharmacy (Pharm D), Cosmopolitan Hospitals Pvt. Ltd. Trivandrum, Kerala, 695004.

***Corresponding Author: Anson Mathew Joseph**

Doctor of Pharmacy (Pharm D), Cosmopolitan Hospitals Pvt. Ltd. Trivandrum, Kerala, 695004.

Article Received on 07/05/2018 **Article Revised on 27/05/2018** **Article Accepted on 17/06/2018**

ABSTRACT

Staphylococcal scalded skin syndrome is a condition which predominantly affects children and causes a spectrum of skin lesions. Staphylococcal scalded skin syndrome (SSSS) is caused by an exfoliative toxin produced by roughly 5% of Staphylococcus aureus. Epidermolytic toxins are produced by the infecting Staphylococcus species; these toxins act at a remote site leading to a red rash and separation of the epidermis beneath the granular cell layer. We present a case of a 2years old infant with SSSS, emphasizing the role of early diagnosis, treatment and discussing the latest developments in the field. The diagnosis of staphylococcal scalded skin syndrome was reached on clinical grounds. The patient responded well to the treatment, which included an antibiotic (Ceftizoxime, Linezolid), an analgesic (paracetamol), Metronidazole + Mupirocin ointment, aloe Vera gel and hydration with intravenous fluids. She was discharged after 10days, with almost complete resolution of his skin lesions. Although most cases of SSSS respond well to conventional therapy, it is a potentially fatal condition. Hence, early diagnosis, prompt treatment, and following robust hygiene measures are imperative for its successful management. More efforts are required to develop novel effective therapies for SSSS.

KEYWORDS: Staphylococcal Scalded Skin Syndrome, Epidermolytic Toxins, Exfoliations.

INTRODUCTION

Staphylococcal Scalded Skin Syndrome (SSSS), also known as pemphigus neonatorum or Ritter's disease, or Localized bullous impetigo is a dermatological condition caused by Staphylococcus aureus encompasses a spectrum of superficial blistering skin disorders caused by the exfoliative toxins of some strains of Staphylococcus aureus. It is a syndrome of acute exfoliation of the skin typically following an erythematous cellulitis most common in children under 6. Severity of staphylococcal scalded skin syndrome varies from a few blisters localized to the site of infection to a severe exfoliation affecting almost the entire body. A mild form of the illness involving desquamation of just the skin folds following impetigo has been described.[1]

The epidermolytic toxins (ETs) released by Staphylococcus aureus, particularly ETA and ETB, are thought to lyse desmoglein-1, present on desmosomes located in the strata granulosum of the epidermis, causing a loss of cell-to-cell adhesion between the keratinocytes, finally leading to intraepidermal splitting.[2] It heals within 10–14 days without scarring.[3] We present a case of a 2years old infant with SSSS, emphasizing the role of early diagnosis, treatment and discussing the latest developments in the field.

CASE PRESENTATION

A 2 year old female child came into pediatric out-patient department with a history of high grade intermittent fever, nasal block, rhinitis past 2 days. After one day the patient developed rashes associated with peeling of skin, pain on touch. She had no H/O any drug intake, similar complaints in past. The child was developmentally normal and immunized for age. The child was irritable and afebrile at that point of time.

General examination showed generalized erythematous rashes over neck and axilla. Peeling of skin on touch was positive (positive Nikolsky's sign). She had tenderness and warmth on touch. At first the genitals were normal. But after some period of time peeling and erythema were seen on perioral, nasal and genital areas. Body folds showed skin peeling and erythema along with skin tenderness. After all these manifestations bullae began to develop in all these areas primarily over scalp.

Biochemical findings revealed a greater total count (TC) value of 12380 cells/µL. ESR was found to be normal (07mm/hr). A diagnosis of SSSS (Staphylococcal Scalded Skin Syndrome) was reached based on the history and clinical features. A skin biopsy was not requested as the clinical features were consistent with the diagnosis.

An intravenous (IV) line was introduced for the infusion of IV fluids. The patient was given IVF Isolyte P at 48ml/hr SOS as a fluid supplement. Parenteral Ceftizoxime 500mg was given every 8 hours for 5 days to cover up the bacterial infection. Paracetamol syrup (250mg/5ml) 5ml Q6H along with Paracetamol suppository (170mg+ 40mg) SOS was given for pain management. Along with third generation Cephalosporin's (Ceftizoxime), Linezolid 100mg syrup 7.5 ml Q8H for 10 days were also given to getter better coverage over resistant Staphylococcal strains. The patient respond well to antibiotic therapy.

As the patient had complaints of nasal block she was given normal saline nebulization 3ml stat. The prescriber advised to apply Metrogyl M (Metronidazole+ Mupirocin) ointment for local application at the affected skin areas and Alokem 75 gel (Aloe Vera 75%) for local application at dry areas after cleaning the skin with normal saline daily. The patient respond well to local treatment. After 10 days of therapy, the erythroderma completely resolved, and the skin lesions were healing with incrustations. The patient was subsequently discharged.

DISCUSSION

SSSS is a rare disease with an incidence between 0.09 and 0.56 cases/ million^3. An infection with Staphylococcus aureus usually precedes SSSS. Staphylococcus aureus releases numerous toxins, which spread hematogenously from the locus of infection. Two ETs, particularly ETA and ETB, have been found to have an affinity toward the glycoprotein, desmoglein-1, present on desmosomes located in the zona granulosa layer of the skin. ETA and ETB lyse desmoglein- 1, thereby destroying the cell-to-cell adhesion between the keratinocytes, leading to epidermolysis.[2,4]

Internationally, predominance is in children as well. Overall incidence is higher in developing countries and wherever the incidence of staphylococcal infections is higher. Additionally, some geographic difference exists in the incidence of staphylococcal strains and the types of exotoxins produced.[5] Some recent reports show an increase in hospitalizations and prescriptions for staphylococcal disease, including SSSS, in England.[6] Children are more at risk because of lack of immunity and immature renal clearance capability (exfoliative toxins are renally excreted). Maternal antibodies transferred to infants in breast milk are thought to be partially protective, but neonatal disease can still occur possibly as a result of inadequate immunity or immature renal clearance of exotoxin.[7,8,9,10] Most children (62%) are younger than 2 years, and almost all (98%) are younger than 6 years. Similarly, immunocompromised adults or adults with renal diseases show a higher incidence of SSSS.[3]

Staphylococcal scalded skin syndrome (SSSS) is caused by an exfoliative toxin produced by roughly 5% of Staphylococcus aureus. As the syndrome evolves, an initial infection occurs, commonly at a site such as the oral or nasal cavities, throat, or umbilicus.[2] Epidermolytic toxins are produced by the infecting Staphylococcus species; these toxins act at a remote site leading to a red rash and separation of the epidermis beneath the granular cell layer. Bullae form, and diffuse sheet like desquamation occurs. Two types of staphylococcal scalded skin syndrome are thought to exist: a localized form, in which there is only patchy involvement of the epidermis, and a generalized form, in which significant areas of are involved, remote from the initial site of infection.

Two exfoliative toxins (ETA and ETB) have been isolated and characterized, but the exact mechanism by which they cause exfoliation had until recently been uncertain. The toxins likely act as proteases that target the protein desmoglein-1 (DG-1), an important keratinocyte cell-to-cell attachment protein found only in the superficial epidermis.[3,4,5] The relative quantity of DG-1 in the skin differs with age and may partially explain the increased frequency of staphylococcal scalded skin syndrome in children younger than 5 years. It is theorized that immature renal function in this age group may contribute to impaired clearance of circulating exotoxins, contributing to more extensive disease. Another theory suggests that the exfoliative toxins may possess a superantigenic activity.

The decrease in frequency of staphylococcal scalded skin syndrome (SSSS) in adults is thought to be explained by the presence of antibodies specific for exotoxins and also improved renal clearance of toxins that are produced.[7]

Initial studies suggested that phage lytic group II S aureus (subtypes 3A, 3B, 3C, 55 and 71) were solely responsible for exfoliative toxin production, but it is now known that all phage groups are able to produce exfoliative toxin and cause staphylococcal scalded skin syndrome.[8]

Staphylococcal scalded skin syndrome differs from bullous impetigo. Both are blistering skin diseases caused by staphylococcal exfoliative toxin. However, in bullous impetigo, the exfoliative toxins are restricted to the area of infection, and bacteria can be cultured from the blister contents. In staphylococcal scalded skin syndrome, the exfoliative toxins are spread hematogenously from a localized source potentially causing epidermal damage at distant sites. Therefore, cultures of the bullous material are sterile.[9]

Staphylococcal scalded skin syndrome differs from the more severe toxic epidermal necrolysis (TEN), in that the cleavage site in staphylococcal scalded skin syndrome is intraepidermal, as opposed to TEN, which involves necrosis of the full epidermal layer (at the level of the basement membrane).[7,8]

Staphylococcal scalded skin syndrome (SSSS) presents as a macular erythema followed by diffuse epidermal exfoliation. The following may be noted: General malaise, Fever, Irritability, Skin tenderness, Fever, although patients may be afebrile, Tenderness to palpation, Warmth to palpation, Facial edema, Conjunctivitis, Perioral crusting, but mucous membranes are spared, Most patients do not appear severely ill, Dehydration may be present and significant[11], Nikolsky sign (gentle stroking of the skin causes the skin to separate at the epidermis).[12,13] Diffuse erythematous rash often begins centrally, is sandpaper like (progressing into a wrinkled appearance, and accentuated in flexor creases.

Infection by group 2 phage S aureus (several types) leads to release of exotoxin. Exotoxin is a protein and is classified as either type A or B. Most are type A. Exotoxin causes separation of the epidermis beneath the granular cell layer. Cases of staphylococcal scalded skin syndrome (SSSS) have been reported among infants who have breastfed from mothers with S aureus breast abscess.[11]

The diagnosis of SSSS is made clinically. This is sometimes confirmed by isolation of S. aureus from blood, mucous membranes, or skin biopsy; however, these are often negative. Skin biopsy may show separation of the superficial layer of the epidermis (intraepidermal separation), differentiating SSSS from TEN, wherein the separation occurs at the dermo-epidermal junction (sub epidermal separation). SSSS may be difficult to distinguish from toxic epidermal necrolysis and pustular psoriasis. Also, phage typing the Staphylococcus aureus is found to be useful, as almost 80% of the strains of Staphylococcus aureus causing SSSS belong to phage group II.[4] Other sparingly used diagnostic tools are techniques measuring the titers of the ETs and isolating their gene sequences.[4]

White blood count (WBC) may be elevated; however, often WBC is normal. Erythrocyte sedimentation rate (ESR) frequently is elevated. Electrolytes and renal function should be followed closely in severe cases where fluid losses and dehydration via denuded skin are a concern. A polymerase chain reaction (PCR) serum test for the toxin is available. Typing of staphylococcal isolates for phage and subtype and the presence of exotoxin production is usually not necessary but is available at some centers. Cultures of bullae are negative in the absence of contamination. Blood culture is usually negative in children (but positive in bullous impetigo) and is usually positive in adults. A Gram stain and/or culture from the remote infection site may confirm staphylococcal infection.[11]

In the prehospital phase, treatment will be likely limited to antipyretic therapy and treatment of the dehydration with intravenous fluid therapy during transport. Most patients are brought to the emergency department by parents or caregivers. The major focus of ED (Emergency Department) care should be to identify staphylococcal scalded skin syndrome (SSSS) and to stabilize the patient's condition. Once SSSS is diagnosed, the treatment consists of supportive care and eradication of the primary infection. Patients need fluid rehydration, topical wound care similar to the care for thermal burns, and parenteral antibiotics to cover S aureus.

Consideration must be given for the sharply increasing rates of community-acquired S aureus infection (CA-MRSA). Prompt treatment with parenteral anti-staphylococcal antibiotics is essential. Most staphylococcal infections implicated in staphylococcal scalded skin syndrome have penicillinases and are resistant to penicillin. Penicillinase-resistant synthetic penicillin’s such as nafcillin or oxacillin should be started promptly. In areas with significant MRSA prevalence (or if MRSA is suspected), antibiotics with MRSA coverage (e.g., vancomycin or linezolid) are indicated.[14,15]

Clindamycin may also be used to inhibit bacterial ribosomal production of exotoxin. Fluid rehydration is initiated with Lactated Ringer solution at 20 mL/kg initial bolus. Repeat the initial bolus, as clinically indicated, followed by maintenance therapy with consideration for fluid losses from exfoliation of skin being similar to a burn patient. Topical wound care, in severe cases, in a dedicated burn center should be provided. Cultures from the exfoliated sites as well as nose, throat, and other potential sites of the original focus of infection should be performed.

Topical therapy should constitute either fusidic acid and/or mupirocin as adjunct therapy at the site of blisters in an attempt to eradicate colonization. Exposed, damaged areas can be treated with emollients which sooth and moisturize the skin. Other important aspects to be addressed in the management of SSSS are temperature regulation, fluid resuscitation, analgesia, sterile dressing of the lesions, and prevention of secondary infections. Paracetamol is the analgesic of choice in cases of SSSS. Corticosteroids are contraindicated as they worsen the disease. With early diagnosis and management, mortality rate of SSSS is lower than 4% in children, and most skin lesions resolve by 2 weeks, as found in our patient.

The prognosis of SSSS in children is excellent, with complete resolution within 10 days of treatment, and without significant scarring. However, SSSS must be differentiated carefully from toxic epidermal necrolysis, which carries a poor prognosis. The prognosis in adults is generally much worse, and depends upon various factors such as time to treatment, host immunity, and comorbidities.

CONCLUSION

This case report highlights SSSS and its challenges in diagnosis and treatment. Therapeutic options and differential diagnosis are discussed. This case report highlights the successful therapy in our patient. Although most cases of SSSS respond well to conventional therapy, it is a potentially fatal condition. Hence, early diagnosis, prompt treatment, and following robust hygiene measures are imperative for its successful management. More efforts are required to develop novel effective therapies for SSSS.

Conflict of Interest

None declared.

REFERENCES

1. Hubiche T, Bes M, Roudiere L, Langlaude F, Etienne J, Del Giudice P. Mild staphylococcal scalded skin syndrome: an underdiagnosed clinical disorder. Br J Dermatol., 2012 Jan.; 166(1): 213-5. [Medline].
2. Amagai M, Matsuyosih N, Wang ZH, et al. Toxin in bullous impetigo and staphylococcal scalded-skin syndrome targets desmoglein 1. Nat Med, 2000; 6: 1275–1277.
3. Handler, M. Z., and R. A. Schwartz. 2014. Staphylococcal scalded skin syndrome: diagnosis and management in children and adults. J. Eur. Acad. Dermatol. Venereol., 28: 1418–1423.
4. Ladhani S. Recent developments in staphylococcal scalded skin syndrome. Clin Microbiol Infect, 2001; 7: 301–307.
5. Murono K, Fujita K, Yoshioka H. Microbiologic characteristics of exfoliative toxin-producing Staphylococcus aureus. Pediatr Infect Dis J., 1988 May; 7(5): 313-5. [Medline].
6. Hayward A, Knott F, Petersen I, Livermore DM, Duckworth G, Islam A. Increasing hospitalizations and general practice prescriptions for community-onset staphylococcal disease, England. Emerg Infect Dis., 2008 May; 14(5): 720-6. [Medline]. [Full Text].
7. Norbury WB, Gallagher JJ, Herndon DN, Branski LK, Oehring PE, Jeschke MG. Neonate twin with staphylococcal scalded skin syndrome from a renal source. Pediatr Crit Care Med., 2010 Mar.; 11(2): e20-3. [Medline].
8. Kadam S, Tagare A, Deodhar J, Tawade Y, Pandit A. Staphylococcal scalded skin syndrome in a neonate. Indian J Pediatr., 2009 Oct.; 76(10): 1074. [Medline].
9. Kapoor V, Travadi J, Braye S. Staphylococcal scalded skin syndrome in an extremely premature neonate: a case report with a brief review of literature. J Paediatr Child Health., 2008 Jun.; 44(6): 374-6. [Medline].
10. O'Connell NH, Mannix M, Philip RK, MacDonagh-White C, Slevin B, Monahan R, et al. Infant Staphylococcal scalded skin syndrome, Ireland, 2007--preliminary outbreak report. Euro Surveill., 2007 Jun 14; 12(6): E070614.5. [Medline].
11. Randall W King, MD, FACEP, Staphylococcal Scalded Skin Syndrome (Serial from internet). Available from: https://emedicine.medscape.com/article/788199
12. Uzun S, Durdu M. The specificity and sensitivity of Nikolsky sign in the diagnosis of pemphigus. J Am Acad Dermatol, 2006 Mar.; 54(3): 411-5. [Medline].
13. Acland KM, Darvay A, Griffin C, Aali SA, Russell-Jones R. Staphylococcal scalded skin syndrome in an adult associated with methicillin-resistant Staphylococcus aureus. Br J Dermatol., 1999 Mar.; 140(3): 518-20. [Medline].
14. Kaplan SL, Deville JG, Yogev R, Morfin MR, Wu E, Adler S, et al. Linezolid versus vancomycin for treatment of resistant Gram-positive infections in children. Pediatr Infect Dis J., 2003 Aug.; 22(8): 677-86. [Medline].
15. Kimberlin DW, Brady MT, Jackson MA, Long SS. Staphylococcal infections. American Academy of Pediatrics Red Book. 30th., 2015; 22: 715.