STAPHYLOCOCCAL SCALDED SKIN SYNDROME DUE TO BURN WOUND INFECTION

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SUMMARY. Introduction. The staphylococcal scalded skin syndrome is an acute exfoliation of the skin caused by exfoliative toxins A and B. Although Staphylococcus aureus is a common cause of burn wound infection, SSSS following burn wound infection is rare. Method. A retrospective review of all SSSS cases admitted to a regional burns service between January 2008 and January 2012 was undertaken. Results. Two cases of SSSS were reported during this time period as occurring following burns injury. The first case was a 17-month-old boy who had been hospitalized for a conservative treatment of 6% total body surface area (TBSA) mixed depth scald burns. On day four he developed exfoliation of 85% TBSA. The second case was a ten-month-old boy who sustained a 1% TBSA scald burn and was managed conservatively in the community by his general practitioner. On day five, he developed exfoliation of 80% TBSA. Staphylococcus aureus was isolated from the burn wounds in both cases. Conclusion: These two cases show that it is vital for burns surgeons and intensive care specialists to be aware of the possibility of SSSS occurring in patients with burns injuries with its potential devastating effects.

Keywords: staphylococcal scalded skin syndrome, SSSS, Staphylococcus aureus, burns, exfoliative toxins

Introduction

Staphylococcal scalded skin syndrome (SSSS) is an acute exfoliation of skin caused by exfoliative toxins A and B. Only 5% of Staphylococcus aureus produce these toxins. The exfoliative toxins spread haematogenously from a localized source causing epidermal damage at distant sites. These exfoliative toxins act as proteases that target the protein desmoglein-1 (DG-1) leading to separation of the epidermis beneath the granular cell layer. There have been reports of cases where patients with SSSS have been admitted to burns units for management. However, SSSS rarely occurs during burns treatment.

The purpose of this study is to review all cases of SSSS due to Staphylococcus aureus burn wound infection at our regional burn service over a 4-yr period 2008-12.

Method

We carried out a retrospective review of all SSSS cases admitted to our regional burns service between January 2008 and January 2012 to identify any case of SSSS that developed during burn treatment.

Results

Two separate cases of SSSS due to Staphylococcus aureus burn wound infection were found during the time frame.

Case 1

A 17-month-old male sustained 6% total body surface area (TBSA) partial thickness burns and was admitted to our burns paediatric ward where the wounds were treated conservatively with Mepitel® dressing (Fig. 1A). The progress of healing was satisfactory until day four, when he suddenly developed diffuse epidermal exfoliation of 35% TBSA with positive Nikolsky’s sign (slight rubbing of the skin that causes the skin to separate at the epidermis) (Fig. 1B). The patient was severely ill, irritable, and dehydrated and was transferred immediately to the Burns Intensive Therapy Unit (Burns ITU). Swabs and blood samples were taken and intravenous fluid, gentamicin and flucloxacillin were started. Examination of the burned areas showed signs of infection of the wound on the dorsum of right foot which converted to full thickness (Fig. 1C). The patient was taken to the theatre where tangential excision of the full-thick-
ness burns on the dorsum of the right foot was performed and an allograft was applied. A punch biopsy was taken from his back and the desquamated areas were debrided and Biobrane® dressing applied. Swabs from his right foot showed growth of *Staphylococcus aureus* with exfoliative toxins A and B detected. Blood cultures and swabs from other sites of the body were negative. There was no other source of infection. Methicillin-resistant *Staphylococcus aureus* (MRSA) screening was also negative. The histology report for the punch biopsy showed loss of the superficial part of epidermis and confirmed the diagnosis of SSSS. After 48 h a change of dressing was performed in the theatre with further desquamation of up to 85% TBSA; however, his general condition was stable. Biobrane® (Smith & Nephew Healthcare Ltd, Healthcare House, 101 Hessle Road, Hull, HU3 2BN, UK) dressing was applied. The progress of healing was satisfactory, inflammatory markers continued to improve and on day 9 the patient was transferred back to the paediatric ward. Autograft was applied to the dorsum of the right foot on day 12. All wounds healed, Biobrane® dressing peeled off spontaneously, and the boy was discharged to go home on day 16.

Case II

A previously healthy ten-month-old male sustained a 1% TBSA scald burn injury to the right side of his chest and was managed conservatively by the general practitioner (GP) in the community using silicone primary contact layer dressings. On day 5 the GP suspected wound infection and referred him to the local hospital. From here he was referred and admitted to our regional burns intensive care unit. On admission to the Burns ITU the patient was severely ill, febrile, and dehydrated; the burn wound was infected and surrounded by generalized epidermal exfoliation (*Figs. 2A* and *B*). Nikolsky’s sign was positive and the clinical diagnosis of SSSS was made, wound swabs taken and ITU care started. Immediate debridement of the 80% TBSA desquamation was undertaken and covered with Acticoat® (Smith & Nephew Healthcare Ltd, Healthcare House, 101 Hessle Road, Hull, HU3 2BN, UK) with intravenous flucloxacinil and gentamicin being implemented. Wound swab showed heavy growth of *Staphylococcus aureus* from the burnt area. Blood cultures and MRSA screening were negative. There was no other source of infection. Gradually his condition improved, inflammatory

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**Fig. 1** - 17 month old male who had 6% TBSA partial thickness burns. a) Day one post burn. b) Day four post burn, desquamation. c) Day four post burn, burns wound infection.

**Fig. 2** - 10 month old male sustained 1% TBSA burns five days post burn. a) Burns wound infection. b) Desquamation of the back.
markers returned to normal and all wounds healed. He was transferred from Burns ITU to Burns Children’s Ward on day 13 post admission and was discharged to home on day 15 after complete wounds healing.

**Discussion**

The diagnosis of SSSS in both cases was, initially, a clinical diagnosis. Clinical features include general malaise, dehydration, fever, irritability, perioral crusting, widespread erythema, tenderness of the skin, exfoliation of skin and positive Nikolsky’s sign. Once the clinical diagnosis of SSSS was made, treatment started immediately.

The growth of *Staphylococcus aureus* together with the detection of exfoliative toxins A and B and loss of the superficial epidermal layers on punch biopsy specimen confirmed the clinical diagnosis of SSSS in case I. The heavy growth of *Staphylococcus aureus* confirmed case II.

The age of the patients is characteristic of the age range within which SSSS commonly occurs. It has been proposed that infants and young children are particularly prone to SSSS, due to their immature renal clearance mechanisms which are inefficient at clearing the exfoliative toxins and also due to a lack of protective antitoxin antibodies.

The mortality rate in children with SSSS is around 3% with early diagnosis and appropriate antibiotic and supportive therapy. However it is reasonable to assume that this mortality rate rises as the number of other co-morbidities rise. In case I, the presence of a burn injury to this malnourished child might increase the likelihood of death from SSSS.

As soon as both cases were diagnosed clinically the patients were managed in isolation in the Burns ITU. No other patients within the unit clinically developed SSSS or tested positive for it. This highlights the importance of strict infection control with patients who have a reduced barrier to infection such as burns. Although *Staphylococcus aureus* is carried asymptomatically in the community, here we can see the potential complications caused by cross-infection into burn wounds.

**Conclusion**

*Staphylococcus aureus* is a common cause of burn wound infection and it is vital for burns surgeons and intensive care specialist to be aware of the increased possibility of SSSS occurring in patients with burn injuries.

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**RÉSUMÉ. Introduction.** Le syndrome de la peau ébouillantée staphylococcique (sigle anglais conventionnel, SSSS) est une exfoliation aiguë de la peau causée par des toxines A et B. Bien que le *Staphylococcus aureus* soit une cause fréquente d’infection des brûlures, la SSSS suite à une infection brûlure est rare. **Méthode.** Les Auteurs ont effectué une revue rétrospective de tous les cas de patients atteints de SSSS hospitalisés admis dans un service régional des brûlures entre janvier 2008 et janvier 2012. **Résultats.** Deux cas de SSSS ont été signalés au cours de cette période qui se sont produits suite à une brûlure. Le premier cas était un garçon de 17 mois qui avait été hospitalisé pour un traitement conservateur pour ébouillantement dans 6% de la surface corporelle totale de profondeur variable. Le quatrième jour, il a développé une exfoliation dans 85% de la surface corporelle. Quant au deuxième cas, il s’agissait d’un garçon de dix mois qui a subi une brûlure de 1% de la surface corporelle et qui a été traité en manière conservatrice dans la communauté par son médecin généraliste. Le cinquième jour, il a développé une exfoliation dans 80% de la surface corporelle. Le *Staphylococcus aureus* a été isolé qui provenait des brûlures dans les deux cas. **Conclusion.** Ces deux cas montrent qu’il est essentiel que les brûlologues et les spécialistes des soins intensifs soient au courant de la possibilité de la présence de SSSS chez des patients souffrant de brûlures, avec tous ses potentiels effets dévastateurs.

**Mots-clés:** syndrome de la peau ébouillantée staphylococcique, SSSS, *Staphylococcus aureus*, brûlures, toxines exfoliatives

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