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CASE REPORT
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Skin care for toxic shock syndrome: case report

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ABSTRACT

Objective: Toxic shock syndrome (TSS) is a severe multisystemic condition caused by *Staphylococcus aureus* or *Streptococcus pyogenes*, and initial management of skin lesions is essential for infection control. This article aimed to describe skin care for TSS. **Case report:** We report a man with a hip abscess who developed fever and hypotension and was subsequently transferred to an intensive care unit (ICU). He was diagnosed with septic shock, probably of hip origin, and was immediately treated surgically for local infection control. He presented with renal failure besides multiple organ dysfunction (hepatic and cardiac), hemodynamic instability, and disseminated skin lesions. With the isolation of *Staphylococcus aureus*, clindamycin was initiated, and the diagnosis was TSS due to epidermolytic lesions since the onset of the condition. Cutaneous recovery measures were initiated with silver sulfadiazine, followed by silver hydrofiber with skin recovery in 8 days. After 10 days of skin recovery, the patient was discharged from the ICU to the ward with maintenance of the proposed treatment. **Conclusion:** In this case, the use of hydrofiber showed satisfactory performance; however, robust studies are needed to confirm such efficacy.

KEYWORDS: Case reports. Toxic shock syndrome. *Staphylococcus aureus*. Burns. Enterostomal therapy.

Cuidados com a pele na síndrome do choque tóxico: relato de caso

RESUMO

Objetivo: A síndrome do choque tóxico (SCT) é uma condição multissistêmica grave, causada por *Staphylococcus aureus* ou *Streptococcus pyogenes*, e o manejo inicial e contínuo das lesões de pele é essencial para o controle da infecção. Este relato teve o objetivo de descrever os cuidados com a pele nessa síndrome. **Relato do caso:** Paciente do sexo masculino com abscesso no quadril que evoluiu com febre e hipotensão e consequente transferência para a Unidade de Terapia Intensiva (UTI). Foi diagnosticado com choque séptico de provável foco no quadril, imediatamente abordado cirurgicamente para tratamento local da infecção. Apresentou insuficiência renal, além de disfunção multissistêmica (hepática e cardíaca), instabilidade hemodinâmnica e lesões disseminadas de pele. Com o isolamento do *Staphylococcus aureus*, iniciou-se clindamicina e o diagnóstico foi de SCT, uma vez que apresentou lesões epidermolíticas desde o início do quadro. Foram iniciadas medidas de recuperação cutânea com a sulfadiazina de prata e, posteriormente, com hidrofibra com prata com restauração do epitélio em 8 dias. Após 10 dias da pele restaurada, o paciente recebeu alta da UTI para enfermaria com manutenção do tratamento proposto. **Conclusão:** Neste caso, o uso da hidrofibra obteve uma *performance* satisfatória, contudo ainda há necessidade de estudos robustos que comprovem tal eficácia.

PALAVRAS-CHAVE: Relato de caso. Síndrome do choque tóxico. *Staphylococcus aureus*. Queimaduras. Estomaterapia.

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Cuidado de la piel en el síndrome de shock tóxico: reporte de caso

RESUMEN

Objetivo: El síndrome de *shock* tóxico (SST) es una afección multisistémica grave causada por *Staphylococcus aureus* o *Streptococcus pyogenes*, y el tratamiento inicial y continuo de las lesiones cutáneas es esencial para controlar la infección. Este informe tuvo como objetivo describir los cuidado de la piel en este síndrome. **Reporte del caso:** Paciente masculino con absceso en la cadera que desarrolló fiebre e hipotensión y fue tranferido a la Unidad de Cuidados Intensivos (UCI). Se diagnosticó *shock* séptico, probablemente focalizado en la cadera, por lo que fue inmediatamente abordado quirúrgicamente para tratamiento local de la infección. Presentó insuficiencia renal además de disfunción multisistémica (hepática y cardiaca), inestabilidad hemodinámica y lesiones cutáneas diseminadas. Con el aislamiento de *Staphylococcus aureus*, se inició clindamicina y el diagnóstico fue SST, ya que presentaba lesiones epidermolíticas desde el inicio del cuadro. Se iniciaron medidas de recuperación cutánea con sulfadiazina de plata y, posteriormente, se optó por hidrofibra con plata, con restauración del epitelio en 8 días. Después de 10 días de piel restaurada, el paciente fue dado de alta de la UCI a planta con mantenimiento del tratamiento propuesto. **Conclusión:** Alcen este caso, el uso de hidrofibra obtuvo un desempeño satisfactorio, sin embargo, aún se necesitan estudios robustos para probar tal eficacia.

PALABRAS CLAVE: Informes de casos. Síndrome del shock tóxico. *Staphylococcus aureus*. Quemaduras. Estomaterapia.

INTRODUCTION

In recent decades, there has been a significant increase in the proportion of toxic shock syndrome (TSS) cases associated with staphylococcal/streptococcal colonization or infection at various sites, particularly in patients in the postoperative period[1-4]. An important factor contributing to the changing epidemiology of TSS is the resistance of microorganisms to antibiotics, both in health care facilities and in the community[5,6]. Annual incidence of TSS is estimated at 0.2 cases per 100,000 people. Mortality rate ranges from 30% to 70%[7].

Since the initial description of TSS in 1978, considerable progress has been made in understanding its pathogenesis[6]. Some superantigen toxin-producing strains of *Staphylococcus aureus* and *Streptococcus pyogenes* are known to induce a potent inflammatory response that alters capillary permeability and culminates in shock. Although often confused with septic shock, TSS includes specific clinical manifestations, such as rash, desquamation of the feet and hands, muscle involvement, pharyngeal and conjunctival hyperemia, gastrointestinal symptoms, and rapidly progressing acute renal failure[8].

One focus of treatment of TSS is removal of the source of infection; therefore, management of the lesions is a priority, as compromised skin integrity may perpetuate TSS[9]. This case report is justified by the aggressiveness of the skin lesions and the complexity of their management. There is also a notable lack of scientific studies detailing this type of treatment, most of which are case reports[2,10,11].

A search for patient electronic medical records was performed by using the CARE tool, developed by an international group of experts in case reporting, which provides a checklist of recommendations[12-14]. For ethical and legal support, the present study was approved by the Research Ethics Committee of the SARAH Network of Rehabilitation Hospitals. Each patient was asked to sign an informed consent form under protocol number 67465323.2.0000.0022.

CASE REPORT

A 52-year-old man is diagnosed with systemic arterial hypertension (SAH). He has a history of smoking and alcohol consumption, both of which he has quit. He had a previous COVID-19 infection in May 2021, requiring 21 days of hospitalization with 40% lung involvement. In August 2021, he developed significant edema and pain in his knees and feet and was diagnosed with septic arthritis of the knees. In December of the same year, he experienced new pain in his

right hip, with an inconclusive diagnosis. Imaging studies performed at an outside health care facility revealed hip joint involvement with a soft tissue inflammatory process.

In July 2022, he was admitted to a rehabilitation hospital with severe pain in his hips and knees, causing him to use a wheelchair exclusively for mobility. He presented with drainage of purulent, sanguineous discharge from the lateral region of his left thigh. He was admitted to the adult orthopedic service for diagnostic evaluation, pain management, broad-spectrum antimicrobial therapy, which was initially with piperacillin/tazobactam and vancomycin, and rehabilitation.

The next day, the patient developed tachycardia, hypotension, and fever, requiring immediate transfer to an intensive care unit (ICU) with a diagnosis of septic shock, likely from the left hip. In addition, he presented with renal dysfunction and respiratory acidosis requiring fluid resuscitation with crystalloids, blood transfusion, and vasoactive drugs (VAD). In addition, a indwelling bladder catheter was placed, and antibiotic therapy was adjusted with suspension of vancomycin, reduction of the dose of piperacillin/tazobactam, and introduction of linezolid because of worsening renal function.

Because the likely focus was the left hip wound, the patient underwent a *Girdlestone* left hip arthroplasty, fistulectomy, debridement of devitalized wound tissue, and application of a negative pressure wound therapy (NPWT) dressing to control the local infection. The patient returned to the ICU under mechanical ventilation (MV) and sedation-analgesia. Therapy for renal replacement was initiated because of elevated creatinine levels (3.86 mg/dL), electrolyte disturbances, and hyperkalemia (6.8 mEq/L).

On the 1st day of ICU admission, cutaneous involvement was observed as blistering lesions (Figure 1). By the next day, epidermolytic lesions resembling 2nd-degree burns had spread over the entire body (upper limbs, abdomen, posterior thighs, penile shaft, and entire back), with epidermal detachment, exposure of the dermis, and in some areas the deep dermis, without mucosal involvement. There was a significant amount of purulent, sanguineous discharge, thereby requiring the use of absorbent materials and weighing to better control fluid balance (Figure 2).

Figure 1. Skin lesions on the 1st day.

On the 2nd day in the ICU, the patient developed multiple organ dysfunction: atrial fibrillation, requiring the use of amiodarone and dobutamine until the 7th day; hepatic dysfunction (cholestasis) with altered bilirubin levels (transaminases of 192 and 106 IU/L; direct bilirubin of 4.6 mg/dL with a peak of 8.5 mg/dL), necessitating percutaneous cholecystostomy on the 6th day; and hematological issues, with thrombocytopenia reaching as low as 45,000 platelets/mm^3 on the 5th

Figure 2. Skin lesion on the 2nd day.

day. Because of severe and sustained hemodynamic instability, besides increased rates of norepinephrine and vasopressin infusions, the patient received crystalloids and blood components. Nursing staff faced difficulties repositioning the patient in bed for two days.

On the 3rd day, because of decreased perfusion of the extremities, the patient developed foot lesions characteristic of poorly defined ischemia associated with epidermolytic lesions, purulent exudate, and the possibility of amputation. Doppler ultrasound of the venous and arterial networks of the lower extremities and a computed tomography scan of the feet showed no changes. Wound care team suggested conservative management and laser therapy with a 100-mW device.

In the areas adjacent to the ischemia, photobiomodulation (PBM) was performed simultaneously with red and infrared lasers (660 nm/808 nm) with a point-contact technique by applying 4 J/point (2 J for each wavelength) for 20 seconds per point, with a distance of 1.5 cm between points. Hydration and heating of the areas were maintained until ischemia was clearly defined.

After using polyhexamethylene biguanide (PHMB) to clean the epidermolytic lesions with purulent exudate, photodynamic therapy (PDT) was performed with methylene blue, achieving an activation time of 5 minutes. Red laser (660 nm) was applied by using a point-contact technique with a small distance between the tissue and the beam. 2 J/point was delivered for 20 seconds per point, with a distance of 1 cm between points. Silver-containing hydrofiber was also used.

During the 1st week, PBM and PDT treatments were performed on alternate days. From the second week, with defined ischemia and reduction of exudate, the silver hydrofiber could be removed. Conservative and enzymatic (collagenase) debridement was initiated, and the application was adjusted to twice weekly with increased energy to 4 J/point for 40 seconds per point in the areas where PDT was still required. In areas beginning to epithelialize, PBM was reduced to 0.2 J/point for 2 seconds per point.

On the 4th day, *Staphylococcus aureus* was isolated from the left hip abscess. Clindamycin was added to the antimicrobial regimen. Diagnosis of staphylococcal toxic shock syndrome was confirmed because of cutaneous involvement. The patient showed improvement in hemodynamics, and bed repositioning was resumed along with initiation of skin recovery measures.

On the 5th day of hospitalization, after analgesia with opioids, the lesions were cleansed with PHMB, and silver sulfadiazine was applied to the extensive lesions on the body (Figure 3). However, after 6 days of treatment, the secondary dressing adhered to the wound beds and caused bleeding. Silver sulfadiazine was applied 4 times daily because it was cleared from the skin by the exudate (2,000 mL/day), necessitating the use of morphine with each reapplication.

Figure 3. Widespread lesions (starting silver sulphadiazine).

Because of the difficulty in using silver sulfadiazine, the ICU wound care team decided to use PHMB for skin cleansing and silver-containing hydrofiber as the primary dressing; cotton gauze and bandages were the secondary dressing. Criteria for secondary dressing change were defined as 40% saturation and the need for removal of the silver-containing hydrofiber.

On the 1st day of Hydrofiber treatment, exudate decreased to 1,000 mL/day; by the 3rd day, losses were negligible, eliminating the need for measurement. The frequency of dressing changes decreased from every 6 hours to twice daily and after the 3rd day to every 48 hours, reducing the need for rescue morphine doses. By the 3rd day of use, the upper limbs were completely epithelialized. After the 5th day of use, there was an 80% improvement: the upper limbs, abdomen, left thigh, penile shaft, and two-thirds of the back were epithelialized. After the 8th day of treatment, complete epithelialization of the lesions was achieved, thereby facilitating the patient's ability to get out of bed (Figure 4).

Figure 4. Healed wounds after treatment with silver-containing hydrofiber.

A new microorganism was isolated from the blood culture: multidrug-resistant Acinetobacter baumannii. Polymyxin B was started intravenously but was discontinued on the 19th day of ICU stay because of suspected nephrotoxicity, with a resolution of the condition. Throughout the hospitalization, meetings were held between the multidisciplinary team and the family to make decisions and provide updates on the patient's condition, with frequent medical bulletins and scheduled visits. From the 15th day of hospitalization, the family was allowed continuous accompaniment to contribute to the patient's mental health.

The patient was discharged to the ward after 31 days in the ICU on spontaneous ventilation with a peripherally inserted central catheter (PICC) for continued antibiotic therapy with linezolid and clindamycin. The biliary catheter was closed for drainage, with a plan to remove it on the 45th day after insertion. The negative pressure wound therapy (NPWT) dressing on the left hip was scheduled to be changed every 7 days until significant improvement of the lesion, and debriding dressings with adjunctive laser therapy were used as conservative treatment for the ischemic lesions on the lower limbs.

DISCUSSION

Care for staph infections includes treatment of septic shock, debridement of lesions, and antibiotic therapy. Drainage of any foci is recommended. Surgical wounds may not appear infected because of the reduced inflammatory response after initiation of medication; however, wound exploration should be performed in patients with toxic shock syndrome (TSS) associated with recent surgery[9,15]. In the case of this patient, surgical debridement was performed with abscess drainage and application of negative pressure wound therapy (NPWT) to the surgical site, which favored maintenance of this drainage while systemic treatment was delivered.

Staph TSS is also associated with refractory hypotension and diffuse capillary leak, requiring extensive fluid resuscitation to maintain perfusion[9]. The use of VADs may also be necessary, as was the case in this report. The inability to mobilize was considered a relevant factor in the initial management of the dorsal lesions, as repositioning was suspended for a period when the patient was more severely ill and hemodynamically unstable, complicating dressing changes.

A diffuse macular rash resembling sunburn was observed, also involving the palms and soles. There was no mucosal involvement as described in some cases[16]. There was no mucosal involvement as described in some cases. Because the lesions initially behaved like burns, treatment was initiated with silver sulfadiazine, which is indicated to treat infected wounds or those at high risk of infection[17]. However, blister rupture and excessive exudate required frequent dressing changes.

Silver sulfadiazine is a topical antimicrobial agent with a healing potential that is commonly used to treat burns, infected wounds, and as prophylaxis for vascular catheterization. Silver is slowly released into the wound; when activated, silver has broad-spectrum antimicrobial activity and anti-inflammatory potential[18]. Each silver-containing dressing has its own frequency of change and management; however, a negative aspect is that silver sulfadiazine requires more frequent changes, potentially up to 12 hours[19]. This negative aspect was observed in the reported case as the dressings were changed more frequently than recommended, every 6 hours, due to the large amount of exudate. This may have reduced the healing effect of silver sulfadiazine.

The use of silver-based dressings, silicone-coated nylon, and biosynthetics is associated with better burn healing outcomes compared to silver sulfadiazine; however, all recommendations have a low level of evidence[20]. There is also no clear difference in healing time when comparing the topical use of silver in cream and hydrofiber forms[21]. As a result, the use of silver sulfadiazine is still widely used as a first-line approach for burns[18,22]. In this report, a change of primary dressing resulted in a significant improvement, mainly because of the excess exudate presented.

The use of silver-containing hydrofiber required more time to apply the dressing because of the large extent of the affected areas, requiring a significant number of sheets for effective coverage. The improvement in hemodynamic status was an important factor in using this dressing, as the patient had to remain in the lateral decubitus position for an extended period for the procedure. The reduction in hip pain also favored maintaining this position, resulting in better patient cooperation during the procedure.

Silver-containing hydrofiber is known to be a primary, nonadherent dressing typically used in sheet form. Silver-containing hydrofiber has a high absorption potential because of the presence of carboxymethyl cellulose fibers, a substance that transforms into a colloid upon contact with fluids. In the case of hydrofiber, the formation of this colloid is stable, preventing secretions from spreading and macerating the edges[18]. The use of silver-containing hydrofiber was critical for controlling exudate and improving the lesions.

After applying silver-containing hydrofiber, there was a reduction in the frequency of dressing changes and bed linen changes, as the dressings did not saturate as they had previously. In addition, epithelial tissue began to appear shortly thereafter, demonstrating the superiority of this dressing in this setting. Despite the low level of evidence for both wound treatment methods[19], the experience with these dressings showed that silver hydrofiber had a more significant response compared to silver sulfadiazine.

CONCLUSION

In conclusion, staph TSS is a serious event requiring early recognition and immediate intervention with intensive care. The management of the presented clinical and dermatologic conditions included skin care as an adjunctive therapy throughout the process. In this case, the management of the lesions with silver-containing hydrofiber showed a satisfactory performance, which suggests silver-containing hydrofiber could be an alternative for the treatment of epidermolytic lesions. However, studies with a better methodological design are still needed to confirm such efficacy. The need for well-designed, methodologically rigorous trials of dressing interventions must be emphasized.

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