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Clinical report

Successful treatment of electric burns in young patients with nano-zinc dressings: A case report

Mhd Taisier Dirwan[a,b], Marwan Al-Raeei[a,*], Reham Alwis[a], Razan Alwis[a,c] and Chadi Azmeh[b]

[a] Damascus University, Damascus, Syrian Arab Republic
[b] International University for Science and Technology, Ghabagheb, Syrian Arab Republic
[c] Syrian Arab Republic Ministry of Health, Damascus, Syrian Arab Republic

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ABSTRACT

Burns are the consequence of tissue harm caused by extended exposure to extreme heat, sunlight radiation, other types of radiation, chemicals, or electricity. Burns can vary from minor to life-threatening, and the appropriate treatment depends on the seriousness and location of the burn. Severe and extensive burns necessitate immediate medical attention, and some individuals may need specialized care centers and ongoing medical check-ups for several months. Electric burns occur when the skin is exposed to a weak or strong electric shock, and they can be categorized as mild or severe depending on the length and intensity of the shock. In this case study, we present the treatment of a severe electric burn on a 10-year-old boy's right leg using nano-zinc bandages. The use of these bandages proved to be highly effective in healing the child's injured leg. This case study discusses the treatment of a severe electric burn in a 10-year-old boy using zinc nanoparticles. The authors observed positive outcomes in terms of skin healing after the application of nano-zinc bandages. Zinc nanoparticles have attracted attention due to their antimicrobial properties and ability to aid wound healing. The main significant clinical output is that the case suggests the potential of zinc nanoparticles in aiding wound healing for burns and emphasizing the need for further research on their effectiveness and safety on a larger scale. However, it is important to note that this is a single case study for burning treatments and further research is required to determine the effectiveness and safety of zinc nanoparticles in burn treatment.

Tratamiento exitoso de quemaduras eléctricas en pacientes jóvenes con apósitos de nano-zinc: Un reporte de caso

Palabras clave:
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Quemadura
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Pie
Nano

RESUMEN

Las quemaduras son la consecuencia del daño en los tejidos causado por la exposición prolongada al calor extremo, la radiación solar, otros tipos de radiación, productos químicos o electricidad. Las quemaduras pueden variar desde leves hasta potencialmente mortales, y el tratamiento adecuado depende de la gravedad y ubicación de la quemadura. Las quemaduras severas y extensas requieren atención médica inmediata, y algunas personas pueden necesitar centros de atención especializada y controles médicos continuos durante varios meses. Las quemaduras eléctricas ocurren cuando la piel se expone a una descarga eléctrica débil o fuerte, y pueden ser clasificadas como leves o severas según la duración e intensidad de la descarga. En este estudio de caso, presentamos el tratamiento de una grave quemadura eléctrica en la pierna derecha de un niño de 10 años utilizando vendajes de nano-zinc. El uso de estos vendajes demostró ser altamente efectivo en la curación de la pierna lesionada del niño. Este estudio de caso discute el tratamiento de una severa quemadura eléctrica en un niño de 10 años utilizando nanopartículas de zinc. Los autores observaron resultados positivos en términos de curación de la piel tras la aplicación de los vendajes de nano-zinc. Las nanopartículas de zinc han llamado la atención debido a sus propiedades antimicrobianas y capacidad para ayudar en la curación de heridas. El principal resultado clínico significativo es que se sugiere el potencial de las nanopartículas de zinc para ayudar en la curación de quemaduras y se destaca la necesidad de más investigaciones sobre su efectividad y seguridad a mayor escala. Sin embargo, es importante tener en cuenta que este es un solo estudio de caso sobre tratamientos

* Corresponding author.
E-mail address: mhdm-ra@scs-net.org (M. Al-Raeei).

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para quemaduras y se requiere más investigación para determinar la efectividad y seguridad de las nanopartículas de zinc en el tratamiento de quemaduras.

Introduction

An electric burn occurs when a person experiences burning injuries after contact with an electric current. The severity of these burns can vary based on factors such as the strength and duration of the shock, as well as the path and voltage of the current. Minor electric burns can be treated similarly to other minor burns, but more severe cases can lead to significant health problems. There are situations where electric burns can happen when someone touches grounding or other electrical equipment. These burns can range from first-degree, which cause surface skin damage, to third-degree burns that cause deep skin damage and loss of feeling. Electric shock burns can also affect internal organs. It is important to approach electric burns with caution and be prepared to provide appropriate treatment.[1–10] It is important to note that electric burns can affect any tissue that the electric current passes through, including the nervous system and the heart. When burns are severe, these vital organs are especially vulnerable. In this case study, we will discuss the treatment given to a 10-year-old child who suffered a severe burn on his right foot from an electric shock. The use of nano-bandages proved to be an effective method for managing the child's burn. In the following section, we will give a detailed explanation of the child's condition and describe the treatment he received. Lastly, we will conclude the article by summarizing the important findings and discussing their implications.

Case representation

We present a case report detailing the treatment of a severe electrical burn in a 10-year-old boy using zinc nanoparticles. The family brought their child, N.H., to the clinic seeking treatment for a severe burn on his right foot. The burn was caused by a high voltage electric shock and had resulted in a large, woody area of damaged skin on the child's leg. Upon examination of the burn, it was clear that the skin had been affected by the electric shock for over a week prior to the clinic visit.

To address this, we decided to employ a novel approach utilizing nano-zinc bandages to treat the burn on the leg. Initially, the bandages were applied for a period of 1 week, and the child's family brought him back to the clinic for an initial examination. To our surprise, the middle image in Fig. 1 revealed that the calloused skin had completely disappeared after just 1 week of application. Encouraged by this progress, we decided to continue the treatment using zinc nano-dressings for an additional month. This involved applying the nano-dressings to the affected leg on a regular basis. The results, as shown in the right image of Fig. 1, were remarkable. The figure shows a progression of images detailing the effects of nano bandages on a child's wound. The left side displays a photo of the child before treatment, with the wound clearly visible. In the middle, the image depicts the child after the first application of the bandages, showing some improvement in the wound's appearance. The right side of the figure shows the child after the second application of the nano bandages, revealing significant healing and reduction in the wound size. The series of images demonstrates the effectiveness of nano bandages in promoting wound healing. The application of the nano-dressings triggered the initiation of skin healing on the burned leg. The area that was once damaged and calloused began to regenerate, offering hope for a complete recovery. This case study highlights the potential of zinc nanoparticles in promoting the healing process of severe burns. Further research and clinical trials are necessary to fully understand the effectiveness and application of this innovative treatment approach. However, our initial findings offer promise for the future of burn care and may present a valuable alternative for patients suffering from similar injuries.

Discussion

In this case report, the authors discuss the treatment of a severe electrical burn in a 10-year-old boy using zinc nanoparticles. The patient presented to the clinic with a severe burn on his right leg of the foot, which resulted from a severe electric shock. Upon examination, it was observed that there was a large, woody area of skin on the child's leg, indicating the severity of the burn. The decision was made to treat the burn with nano-zinc bandages. After the first week of treatment, the family brought the child back to the clinic for an initial examination, where it was found that the calloused area of skin on the leg had disappeared. The treatment with zinc nano-dressings continued for a month, during which the nano-dressings were applied to the affected leg. As a result of the treatment, the authors observed that the application of the nano-dressings led to the beginning of skin healing in the burned leg. This can be seen in the images presented in Fig. 1, where the right image shows progress in the healing process. The use of zinc nanoparticles in the treatment of burns has gained attention due to their antimicrobial properties and ability to promote wound healing. In this case, the authors observed positive outcomes in terms of skin healing after the application of nano-zinc bandages. It is important to note that this is a single case report, and further research is needed to determine the efficacy and safety of zinc nanoparticles in burn treatment. Additionally, the authors do not provide detailed information about the specific application frequency or dosage of the nano-zinc bandages. Overall, this case report highlights a potential benefit of using zinc nanoparticles in the treatment of severe electrical burns. It provides preliminary evidence of their effectiveness in promoting wound healing. However, more comprehensive studies are required to validate these findings and establish guidelines for their clinical use.

Conclusion

Being burned is an unpleasant experience whose psychological and physical impact can last a long time. There are many types of burns, ranging from a simple burn that heals automatically without scars, to a deep burn that reaches important nerves in the body, leaving behind large damaged areas, and a third in between with moderate severity and impact. In this case report, we presented a successful treatment of a severe electrical burn in a 10-year-old boy using zinc nanoparticles. The patient had a large, woody area of skin on his leg due to an electric shock, which was effectively treated with nano-zinc bandages. Within 1 week of using the bandages, the calloused area of skin disappeared, and after a month of treatment, the burned leg showed signs of healing. This case highlights the potential of nano-zinc dressings in promoting skin healing in severe electrical burns. In the following lines, we will present methods for treating the effects of various burns, and how they can be dealt with depending on their causes. One type of skin burn is electrical burn. Burns resulting from exposure to electricity may cause severe damage, so it is preferable for the person who has been exposed to them to go to the emergency department in the hospital for necessary

Fig. 1. The leg of the 10-year-old child before, during, and after the treatment by zinc paste.

work. We have reported the case hereby presenting the case of a child who suffered a severe electrical burn in his right leg as a result of being exposed to a severe electric shock. We treated the resulting electrical burn by applying zinc particle bandages to the leg of the child suffering from the burn after visiting the clinic sometime after his injury. The significance of this case study lies in the successful treatment of a severe electric burn in a 10-year-old boy using nano-zinc bandages. The use of these bandages proved to be highly effective in healing the child's injured leg, demonstrating the potential for zinc nanoparticles to aid in wound healing for burns. When the concentration of nano-zinc particles is increased, it can lead to greater toxicity on the surrounding tissues. This is due to the increased accumulation and interaction of the particles with the cells, causing potential damage and impairment of cellular functions. Therefore, careful consideration must be made when determining the optimal concentration of nano-zinc particles to minimize any adverse effects on tissue health. Furthermore, studies have shown that the size and surface properties of the particles can also influence their toxicity, highlighting the importance of evaluating multiple factors when assessing the potential risks associated with using nano-zinc particles. This suggests that zinc nanoparticles may have antimicrobial properties and could be a promising option for burn treatment in the future. However, further research is needed to determine the effectiveness and safety of zinc nanoparticles in burn treatment on a larger scale. This case study highlights the importance of exploring innovative treatments for burns, as severe burns can be life-threatening and require immediate medical attention. The application of these nano-bandages caused the electrical wound to heal and begin to heal.

Ethics approval and consent to participate

Not applicable.

Consent for publication

Patient consent statement: Written informed consent was obtained from the patient to publish this report.

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Authors' contributions

All authors of the article are responsible to the design and implementation of the research to the analysis of the results and to the writing of the manuscript.

Clinical trial registration

The authors have the clinical trial registration in the RW clinic.

Availability of data and materials

All data are included in the manuscript.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.All authors have made substantial contributions to all of the following: (1) the conception and design of the study, or acquisition of data, or analysis and interpretation of data, (2) drafting the article or revising it critically for important intellectual content, (3) final approval of the version to be submitted.The manuscript, including related data, figures and tables has not been previously published and that the manuscript is not under consideration elsewhere.

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