Treatment of Calciphylaxis Induced Lower Extremity Ulcers using Sodium Thiosulfate

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Introduction

Calciphylaxis, also known as calcific uremic arteriopathy, is a rare and life threatening condition which is classified as a tumoral calcino sis [1-6]. It is caused by calcification of micro vessels in the dermis and subcutaneous adipose tissue [1-6]. Calciphylaxis has a high morbidity rate from 46% to 80%, and an average of 50% in patients without uremia. 2,4,7 This disease is more susceptible in white females who are obese and suffer from end-stage renal disease (ESRD). However, it may still occur in patients with normal renal functioning or earlier stages of chronic kidney disease [3-6]. This condition is characterized by painful skin lesions due to ischemia, which may lead to ulceration and necrosis, and is similar in uremic and non-uremic patients [3-6]. Treatment options include hyperbaric oxygen treatment (HBOT) and maggot therapy followed by oral pentoxifyllin [8,9]. The mainstay of treatment for these ulcers, however, is surgical debridement and soft tissue coverage with skin grafts and/or flaps which is quite invasive and associated with significant morbidity and even mortality. Recent reports, however, have highlighted the use of sodium thiosulfate (STS) injections to effectively manage this condition as a non-invasive, non-operative option [8,9].

Case Report

We present the case of a 46-year-old female who developed severe bilateral lower extremity ulcers. She was obese with a body mass index (BMI) of 35, blood pressure of 90/36 and a pulse of 90 with regular heart beats. The patient suffered from small vessel vasculitis involving central nervous system (CNS) vasculitis and renal arteritis which was treated using drug therapy. She was diagnosed with ESRD which was treated by the creation of a left radiocephalic arteriovenous fistula for dialysis. She was also diagnosed with calciphylaxis and suffered from wounds on her bilateral thighs and legs. Initially HBOT was administered but no significant improvement was documented. There were no major complications during her stay of treatment for these ulcers, however, is surgical debridement and necrosis, and is similar in uremic and non-uremic patients [3-6]. This condition is characterized by painful skin lesions due to ischemia, which may lead to ulceration and necrosis, and is similar in uremic and non-uremic patients [3-6]. Treatment options include hyperbaric oxygen treatment (HBOT) and maggot therapy followed by oral pentoxifyllin [8,9]. The mainstay of treatment for these ulcers, however, is surgical debridement and soft tissue coverage with skin grafts and/or flaps which is quite invasive and associated with significant morbidity and even mortality. Recent reports, however, have highlighted the use of sodium thiosulfate (STS) injections to effectively manage this condition as a non-invasive, non-operative option [8,9].

Discussion

Calciphylaxis is a rare condition which typically develops in patients with improper kidney functioning as a result of ESRD and is experiencing the symptoms of hyperparathyroidism [3,5]. The parathyroid gland maintains calcium-phosphorous homeostasis, so an irregularity would cause an imbalance in calcium and phosphate levels [10]. Calciphylaxis usually occurs in patients with improper calcium metabolism, which may lead to the formation of blood clots in microvessels [7]. This buildup of calcium may lead to thrombosis, endovascular fibrosis and mural proliferation [2,7]. Tissues and skin cells do not receive sufficient nutrients nor oxygen, which may lead to painful necrotic skin ulcers [7].

While there are numerous known ways to care for a patient suffering from calciphylaxis such as surgical wound treatment or managing factors that delay healing, managing the condition with STS injections is an effective and non-invasive treatment [1,2]. STS has a long history of medical use [11]. It is a vasodilator and an antioxidant [2-4]. Standard treatment of calciphylaxis using STS consists of 12.5-25 g intravenous doses administered thrice a week for 2 months [2]. Continuous administration of STS is necessary as 20% to 50% of STS is excreted before it reacts with calcium [7]. STS decreases the likelihood of calcium precipitate formation by isolating calcium ions from phosphate ions [1,2,5,7]. Highly soluble calcium thiosulfate complexes are formed, rather than less soluble calcium phosphate compounds [1,2,5,7]. To our knowledge, the first study to review the use of STS to treat calciphylaxis was by Peng, et al. in 2017, which showed promising results [12]. The study included 358 patients from which 70% responded successfully to STS treatment while 37.6% died despite administration of STS [12]. Some complications that arise from STS treatment are pain during administration and induced metabolic acidosis [7].

The treatment for calciphylaxis for our patient was commenced after the failure of HBOT. Significant improvement was noted after the patient was treated using STS by week 4 followed by complete resolution by week 9. There were no major complications during her treatment and the lesions or ulcers have not recurred. Her bilateral thighs and legs have completely healed on STS injection treatment without the need for adjunct wound care or dressings. We believe that STS treatment is a viable treatment option in patients suffering from lower extremity ulcers from calciphylaxis.

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Received: November 27, 2018; Accepted: December 05, 2018; Published: December 26, 2018
Waheed AS (2018) Treatment of Calciphylaxis Induced Lower Extremity Ulcers using Sodium Thiosulfate

Competing Interests
There are no competing interests to declare for any of the authors.

References

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