

Research Article

Contribution of Silver Sulfadiazine in Chronic Leg Ulcers Healing In Côte Ivoire

Kassi K^{*1}, Djeha D¹, Kouame K¹, Kouassi¹ A, Ahogo C¹, Kaloga M¹, Ecra E¹

¹Department of Dermatology and Infectiology, Training research unit of medical sciences, Université Félix houphouët Boigny university of Abidjan

**Corresponding author: Dr. Kassi Komenan, MD, Professor, Department of Dermatology and infectiology, research and training unit of medical sciences, University of Félix Houphouët Boigny of Abidjan-Côte d'Ivoire. 21 BP 5151 Abidjan 21, Email: siskakomlo@yahoo.fr, komenan.kassi@univ-fhb.edu.ci*

Received: 09-01-2015

Accepted: 10-01-2015

Published: 10-08-2015

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Abstract

Background

Chronic leg ulcers represent major causes of morbidity and worsen quality of life in developed countries, as well as in developing countries where the main causes were infection and trauma. Silver sulfadiazine is the local treatment of choice for these ulcers because of its antimicrobial action.

Objective

The study aimed to show the contribution of silver sulfadiazine in the local treatment of chronic leg ulcers in a limited-resources country.

Methods

It was a prospective and descriptive study conducted for 6 months from May to November 2013, with recruitment of patient of any sex and age presenting chronic leg ulcer.

Results

We have recruited 90 patients in total. The patients who observed the treatment protocol were 78. The average age was 40 +/- 1 year (varied from 15 to 54 year old). The sex ratio was 1.4 in favor to men. Necrotizing fasciitis and Buruli ulcer were the most observed aetiologies in 43.6% of cases and 12.8% of cases respectively. These ulcers were mostly located on the lower limb in 71.8% of cases. Infections were found in 79% of cases. We reported total wound healing in 90% of cases and a partial wound healing in 10% of cases after 4 weeks of treatment. We reported a good observance and tolerance of the treatment.

Conclusion

Because of its anti-bacterial actions, Silver sulfadiazine could be useful in the treatment of chronic leg ulcers in limited-resource countries, in particular in Côte d'Ivoire where infectious causes are frequent.

Keywords: Silver Sulfadiazine; Chronic Leg Ulcers; Wound Healing; Local Treatment.

Introduction

Chronic wounds are defined as wounds, which have failed to proceed through an orderly and timely reparative process to produce anatomic and functional integrity over a period of 3 months. This cicatrization process goes through 3 phases, as follow, inflammatory phase, proliferation phase, and maturation phase. Meanwhile, this maturation could be delay by several factors such as infections and co-morbidities (diabetes, venous insufficiency, under nutrition; etc...). [1]. In developed countries, chronic leg ulcer represents a major cause of morbidity and bad quality of life which impacts negatively public health budget [2, 3]. In Africa, these ulcers are mostly caused by infections and trauma or vascular abnormalities [4]. Ulcer care remained on local treatment associated with or without surgery and sometimes added to systemic antibiotics or aetiology related-specific treatment. The efficacy of silver sulfadiazine in chronic leg ulcer and in skin burns treatment was reported by previous studies in developed countries [5]. In fact, silver sulfadiazine combines the power of silver ions to the bacteriostatic action to heal wound [6]. Its usage in chronic leg ulcers has not been reported yet in our setting. The aim of this study was to show the contribution and the efficacy of silver sulfadiazine in chronic leg ulcers healing in a limited-resources country.

Methods

Type of study: It was a prospective and descriptive study that was conducted for six (06) months of duration from January 2013 to June 2013.

Location of the study: The study was conducted at the department of dermatology of the teaching hospital of Treichville in Abidjan (the economic capital of Côte d'Ivoire).

Criteria of Inclusion:

-All patients consulted or hospitalized in our department for chronic leg ulcer during the study period.

- Patients who gave their informed consent to participate in the study.

Non-inclusion criteria:

- Patients who have presented the following diseases: Gangrenous, Mucosal or genital ulcerations, Malignant skin ulcers

-Patients who did not give informed consent for the study

-Patients with allergy to active ingredients (hypersensitivity)

-New born

Exclusion criteria

-Abandonment of treatment

-Non-adherence to treatment modality and follow up

-Arterial obliteration

Performance of the study

- The silver sulfadiazine is both local antibacterial and antiseptic agents combining sulfonamide to silver ions.

- The treatment Protocol

-The treatment procedure and follow up were explained to the patients

- High protein diet was given to the patients (diet including eggs)

-Swabs were done to diagnose infected wound.

- HIV test was performed after a counseling of patients and informed consent.

-Drugs prescription for wound dressing was them given to the patients.

-Wound dressing was done as follows:

1-Wound is first cleansed with antiseptic or saline.

2-Necrotic or devitalized tissues are removed.

3-Silver sulfadiazine is applied on the ulcer.

The topic is applied Daly during inflammatory phase, every 2 to 3 days during proliferation and maturation phases.

4- Ulcer is covered by dry sterile compress before bandage

-Wound is measured using the maximum diameter and picture is taken during each dressing to appreciate any improvement.

-Beside the topical treatment, each patient received a specific systemic treatment according to the aetiology of the wound. (for example, Buruli ulcer received rifampicin+ streptomycin, and necrotizing fasciitis received penicillin G etc...)

-In some cases, skin graft was made to faster the re-epitheliazation.

- Interpretation of results

-Wound healing was evaluated on day 28th

At the level of Patients, wound was:

-**Healed** when wound was closed completely

-**Improved** when it was closed partially

-**Unhealed** when wound was steady

-**Worse** when wound was infected and suppurative.

At the level of product: **Efficacy (Effective**, when the wound was completely

healed and **non-effective** when it was not healed)

Tolerance (excellent: no adverse effects, **pretty good:**

If the adverse reaction did not stop the treatment,

bad: if

The adverse reaction stopped the treatment)

- The ethic committee of the department of Dermatology approved the study protocol.

Results

We recruited and included 90 patients for the study. Out of them, 78 patients have followed the treatment protocol. Twelve (12) patients were released because they did not follow the treatment procedure or have abandoned the treatment.

The age of our patients varied from 15 to 54 years with a mean age of 40 +/- 1 year. Men (56.4%) were more observed than women (43.6 %) with a sex ratio of 1.4. Co-morbidities were found in 32 patients (35.4%). There were diabetes in 7 patients, venous insufficiency in 8 patients, high blood pressure in 2 patients and HIV positive in 11 patients .The majority (77.8%) of our cases were outpatients , and only 22.2% patients were hospitalized.

The aetiologies of chronic leg ulcers were mostly represented by necrotizing fasciitis in 43.6% of cases, followed by Buruli ulcer in 12.8% of cases (Table1). These ulcers were mostly located on Lower third of the leg (figure1) in 71.8% of cases, followed by the back of the foot in 12.8% of cases (Table 2). The ulcers sizes vary from 1.2 to 9.8 centimeters (cm) of big diameter. The mean size of ulcers was 4.5 +/-1.1 cm. The majority (76.7%) of our patients had both cutaneous and soft tissues necrosis, and in 23.3% of cases patients had only skin necrosis. Ulcers were secondarily infected in 79 % of cases, and mostly by Gram-negative bacilli in particular *Pseudomonas aeruginosa*. The HIV test was performed in 50 patients, and it was positive in 11 patients (22%).We observed complete wound healing (figure 2) in 90% of cases (71/78) and wound improvement in 10% of cases (7/78) on day 28th. Seven patients with partial wound healing had HIV infection. Meanwhile, we did not find worsen cases, nor steady cases and persistent secondary infection after 4 weeks of follow up. An excellent tolerance of silver sulfadiazine was reported in all patients.

Table 1. Frequency of patients according to the chronic leg ulcers aetiologies.

Aetiology	Number (n)	Frequency (%)
Necrotizing Fasciitis	34	43,6
Venous ulcer	8	10,2

Diabetes ulcer	7	10
Chronic tropical ulcer	5	6,4
Buruli ulcer	10	12,8
Cycle cell disease ulcer	2	2,6
Pressure ulcer	5	6,4
Unknown aetiology	7	9
Total	78	100



Before Treatment protocol

Figure 1. Buruli ulcer of the heel associated with secondary infection in 18 year old male patient before treatment protocol.



4 weeks after treatment protocol

Figure 2. Complete wound healing after 4 weeks usage of Silver sulfadiazine and under specific antibiotic treatment (WHO protocol : rifampicin + streptomycin for 8 weeks).

Table 2 . Frequency of patients according to the chronic leg ulcer locations.

Location	Number (n)	Frequency (%)
Lower third of the leg	56	71,8
Back of the foot	10	12,8
Thigh	2	2,6
Average and third upper of the leg	5	6,4
Sole and fingers	5	6,4
Total	78	100

Comments

Our study showed the efficacy of silver sulfadiazine in chronic leg ulcer healing, with complete wound healing in 90% of cases and its good tolerance and observance. In fact, previous study has reported the efficacy of this topical agent. Ermeulen et al showed that Silver sulfadiazine contributes to reduce smell, pain and seeps from wound, by releasing gradually silver ions into it [6]. This action allows improving patients' quality of life [7]. According to Leaper et al, silver sulfadiazine, through its antibacterial action, contributes to control infection which is a limiting factor to wound healing by reducing the local bacterial load [5]. Michael et al have also reported its efficacy by reducing the bacterial load of pseudomonas [8]. Moreover, significant improvement ($P < 0,001$) of the wound healing, in term of duration and cicatrization area was observed by Srivastava et al [9].

In our study, Silver sulfadiazine usage, allowed us to observe a complete wound healing in 90% of cases on day 28th. That could be explained by the fact that in the majority of cases (56.4%), our patients suffered from chronic leg ulcer from infectious aetiology. More other, the treatment of the underlying aetiologies of a chronic wound such as venous insufficiency, Buruli ulcer, necrotizing fasciitis and diabetes that may contribute to poor wound healing as well as the nutritional status(high protein diet in our cases) were key to the successful wound healing. We use Silver sulfadiazine in our study because it is accessible (it costs about 10.00 USD per unit in our setting), contrary to the other methods for wound healing which are expensive, such as surgical excision (the cost is about 1000.00 USD), skin graft (the cost vary from 100 to 1500.00 USD), VAC Therapy (not present in our setting), etc., So compared to surgical procedure, it could be used in first line.

In fact, debridement contributes to convert a chronic wound to an acute wound and hence that it can proceed through normal healing phases. After debridement, neutrophils and macrophages, which are recruited to the area secrete growth factors and phagocytize the bacteria and nonviable tissues [10]. Therefore it improves and fasters wound healing process. All these mechanisms associated with silver sulfadiazine actions and the small ulcers' sizes contribute to heal rapidly chronic ulcer in our cases

Our reports were in accordance with those in the literature. De Vin et al Observed complete wound healing in 100% of cases in 73 patients after 4 weeks of silver sulfadiazine usage [11]. In addition, Ouvry et al have studied the healing and infection rate in their series of 71 outpatients followed up for venous ulcers. In their study, silver sulfadiazine has been applied for 6 weeks. Out of the 29 patients who suffered from infected ulcers at the beginning, only 2 have got their wound still infected after 6 weeks. But, adverse effects were reported in two patients without stopping the treatment [12]. In our study, no adverse effects were reported by using silver sulfadiazine for 4 weeks.

This was also reported by Bender et al. In their prospective study in 64 patients suffered from chronic leg ulcers and treated by silver sulfadiazine for 6 weeks, they reported complete wound healing in 52 patients, partial wound healing in 7 patients and 3 steady cases; but they did not find any infectious cases after 6 weeks of treatment [13]. The partial wound healing observed in the majority of HIV infected patients from our series, could be explained by their immune system depression. In fact, according to Tucker et al, the deep immune depression associated with HIV infection as well as treponema pallidum co-infection delay wound healing and favor extension of the wound [14]. In the other hand, in our series, the ulcer sizes were small with an average diameter of 4.5 +/-1.1 cm, and associated with the co-morbidities treatment, contributed to faster ulcer healing by a re-epithelialization of its edge.

Difficulties of the study

The follow up of the Out patients was difficult due to the non-observance of the additive treatment measures (hyper protein diet, ...) difficulty to have all patients' informed consent to perform HIV test and because they lived far from the hospital.

Conclusion

Because of its good tolerance and effectiveness at any phase of wound healing process,

silver sulfadiazine through its antibacterial activity could be used in chronic leg ulcer in limited-resources countries in particular in Côte d'Ivoire; where wound are mostly infected and may impair healing process.

Conflicts of interest

The authors declared no conflicts of interest

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