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Sodium hypochlorite dressings for the treatment of infected ulcers

Authors
Dr Vinaya K Ambore[1], Dr Shivang Shukla[2], Dr Pranav Mehrotra[3]
Dr Umang Shandilaya[4], Dr Sandeep Darbastwar[5]

[1]Associate Professor and Unit Head, Department of General Surgery, Grant Government Medical College and JJ Group of Hospitals, Mumbai, Maharashtra
Email: *vinaya.ambore@gmail.com*

[2]Junior Resident, Department of General Surgery, Grant government Medical College and JJ Group of Hospitals, Mumbai, Maharashtra
Email: *shivangshukla1993@gmail.com*

[3]Lecturer, Department of General Surgery, Grant Government Medical College and JJ Group of hospitals, Mumbai, Maharashtra
Email: *pranavmehrotra413@gmail.com*

[4]Junior Resident, Department of General Surgery, Grant Government Medical College and JJ Group of hospitals, Mumbai, Maharashtra
Email: *umang321@gmail.com*

[5]Senior Resident, Department of General Surgery, Grant Government Medical College and JJ Group of Hospitals, Mumbai, Maharashtra
Email: *sandeep.darbastwar@gmail.com*

Abstract

Aims and Objectives: *To study the efficacy and feasibility of sodium hypochlorite dressings on infected wounds.*

Materials and Methods: *A case series study was done in a tertiary care hospital where patients having infected ulcers were kept on daily sodium hypochlorite dressings and results were tabulated.*

Results: *Results showed a time period of 4.6 days required for the wound to have a healthy granulation tissue with no slough and purulent discharge. Wound was found to contract by around 1 cm over a period of 3 weeks of daily dressings. A negative wound swab after 4 days of sodium hypochlorite dressings in 76% of the patients also proved it was an effective topical antibiotic. Hence it can be concluded that sodium hypochlorite dressings are an effective and cheap alternative to conventional dressings when treating patients of lower socio economic strata in tertiary care set up.*

Conclusion: *Sodium hypochlorite dressings were found to reduce slough, discharge, promote wound healing and cause a significant wound contracture.*

Keywords: *Sodium hypochlorite dressings, purulent discharge, healthy granulation, wound contracture.*

Introduction

Patients with an infected wound from lower socio economic strata face a lot of challenges such as lack of accessibility to healthcare resources and money. The purpose of this case study is to seek satisfactory and cost effective treatment for such patients.

A wound is a type of injury which happens relatively quickly in which skin is torn, cut, or

punctured (an *open* wound), or where blunt force trauma causes a contusion (a *closed* wound). In pathology, it specifically refers to a sharp injury which damages the dermis of the skin.[1]

Mechanisms of normal wound healing: This is variously described taking place in three or four phases, the most commonly agreed being,

1) the inflammatory phase
2) the proliferative phase
3) the remodelling phase[2]

A wound will never reach the maximum tensile strength of unwounded skin, and at best reaches about 70% [3]

Burden of wounds in a government set up

In an OPD of 90 surgical patients, 20 patients have complaints of an ulcer. It is a major cause of morbidity. Out of these 20 patients almost 5-8 have diabetes mellitus, 2-3 have chronic venous ulcers. In an inpatient ward of around 15 patients, 3-4 have ulcers under evaluation. Almost all of the patients present with an infected ulcer. While bacteria are a normal part of the skin flora and thus wounds, a critical threshold of 10^5 bacteria has been proposed as the delineation between colonization and a clinically relevant infection that may impede wound healing[4]

Most of the chronic wounds are the expression of an underlying physiological condition or systemic disease, such as chronic venous insufficiency, increased mechanical pressure, and vascular, nervous, or metabolic tissue damage[5]

Hence cost effective management of wounds is of utmost importance.

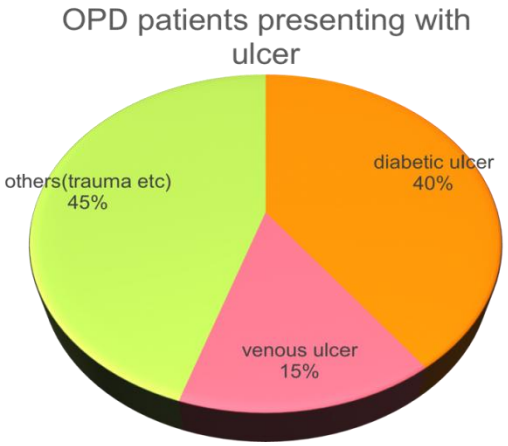

Fig 1, Pie chart showing prevalence of ulcers

There are several options for debridement technique, including surgical, mechanical, autolytic, enzymatic, and biological methods.[6]

Physical methods include timely debridement of slough and the rest compromise of gels, hydrocolloids, alginate, silver creams and various antiseptic creams.

In this study we have taken 50 patients having chronic ulcers over lower limb with obvious of infection which were signs of purulent discharge, pungent odour and fever. These patients were treated with a combination of physical and chemical methods which meant removing slough by simply scooping it and giving a thorough wash by betadine and hydrogen followed by applying sodium hypochlorite wet gauzes. Result were tabulated and a decrease in wound size with substantial decrement in purulent discharge was observed.

Principles involved in sodium hypochlorite solution

Sodium hypochlorite solution when prepared always has an alkaline Ph. This is basically due tohypochlorous acid and sodium hydroxide ions liberated in the solution.

NaCIO+H20= NaOH + HCIO

The concentration of free alkali increases when diluted due to increased dissociation. Free alkali denatures the proteins and also acts as an irritant to normal tissues. Hence addition of boric acid to such a solution not only stabilises the solution but also makes is less irritant.

The principles of solution are as follows:

When bleaching powder is decomposed with sodium carbonate and the filtered solution containing excess alkali is mixed with boric acid such that it is acid to phenolphthalein suspended in water but still alkaline to litmus. This way the solution is neutral and even if free alkali is liberated, it is neutralised by salts of boric acid.[7]

Study design and purpose

This is a prospective longitudinal study of 50 patients who had an infected non-healing ulcer and

were treated using sodium hypochlorite dressings. Feasibility, cost effectiveness and efficacy of this type of dressing in patients of low socio-economic strata was observed.

Methods

Patients with the following criteria were included in the study.A thorough medical history and physical examination are essential to every patient evaluation [8]. These patients were admitted from December 2018 to May 2018 and kept on daily sodium hypochlorite dressings. A case series study was carried out regarding feasibility, cost effectiveness and efficacy of such dressings

Inclusion Criteria

Patients of age 20 to 60 irrespective of sex with an infective non healing ulcer with following –

1) Ulcer area more than 5x5 cm
2) Purulent discharge
3) Presence of slough
4) Pungent odour

Exclusion Criteria

1) Healthy granulating wounds
2) Suture line infection
3) Ulcer area less than 5x5 cm

Treatment

Patients were admitted and were kept on daily sodium hypochlorite dressings. Patients having diabetes mellitus were treated using Insulin and oral hypoglycaemic drugs such that their sugars were under control. Varicose ulcer patients were managed conservatively on oral Diosmin tablets. Dressings were done in a separate dressing room under aseptic precautions. Wounds were first treated with betadine and hydrogen solution and then dried. A sodium hypochlorite soaked gauze was kept over the wound. A 500 ml normal saline pint was mixed with 40 ml freshly prepared sodium hypochlorite solution and 5 gm boric acid was added. The dressing was applied with appropriate standard of care treatment for the wound type, e.g. compression, off-loading footwear, or pressure- relieving devices. Wound bed preparation, such as sharp debridement, also occurred where necessary to remove devitalised tissue and promote a healthy wound base.

Wound assessment was performed as per local standardised criteria, which includes assessment of the wound bed, edge and surrounding skin, exudate levels and presence of odour. Wounds were measured and traced where possible, and photographs taken. Patients were followed up on a daily basis until healthy granulation was seen. Antibiotic was given according to wound swab sensitivity. A wound swab was taken before and after sodium hypochlorite dressings and results were tabulated.

Results

Patients were followed up on daily basis and their wounds were assessed basis of-

1) Reduction in slough
2) Rate of wound contracture
3) Decrease of purulent discharge
4) Presence of healthy granulation tissue
5) wound swab after sodium hypochlorite dressings

Fig 2 49/M having 20cm x 15 cm wound

Fig 3 Wound after 4 weeks of sodium hypochlorite dressing, wound size 19x13 cm with healthy granulation

Fig 4 50/M having 15x10 cm wound

Fig 5 Wound after 1 week of sodium hypochlorite dressings, wound size 15x10 cm with healthy granulation

Fig 6 45/M with PVD stump

Fig 7 PVD stump managed by daily sodium hypochlorite dressings and revision of amputation finally followed by skin grafting of the stump

Fig 9 50/M with 7x5x2 cm diabetic ulcer

Fig 10 Wound after 3 weeks of sodium hypochlorite dressings, with wound size of 6x3x1.5 cm and decrease in purulent discharge with healthy granulation.

Observations

Patients were daily evaluated and following observations were recorded. Out of 50 patients, 32 patients with no co-morbidities had presence of healthy granulation tissue within 4.4 days. In 14 patients with Diabetes mellitus, healthy granulation was observed within an average span of 5 days and of 4 Varicose ulcers within 4.75 days. Wound swab taken after 4 days of sodium hypochlorite dressings turned out to be negative in 38 out of 50 ulcer patients. Hypochlorous acid is highly active against all bacterial, viral, and fungal human pathogens[9] and a small amount of HOCl can kill spore-forming and non-spore bacteria in a short time period.[10][11]

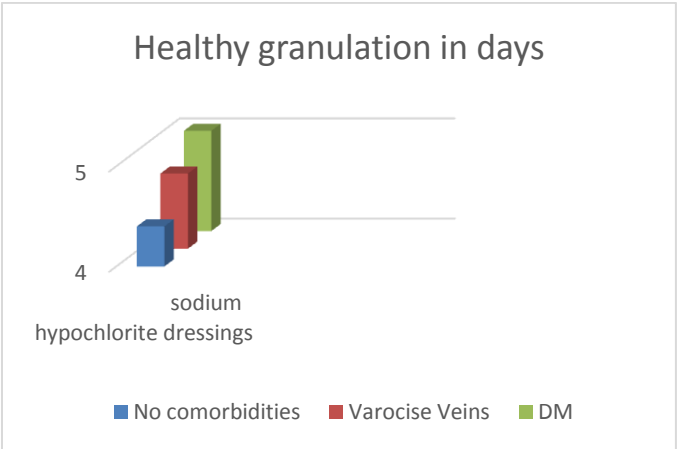

Fig 10 average span of healthy granulation.

Conclusion

Sodium hypochlorite dressings can be an effective alternative to conventional dressings for patients from a lower socio economic strata. It was found to reduce slough, discharge, promote wound healing and cause a significant wound contracture. Results show a time period of 4.6 days required for the

wound to have a healthy granulation tissue with no slough and purulent discharge. Wound is found to contract by around 1 cm^2 over a period of 3 weeks of daily dressings. A negative wound obtained after 4 days of sodium hypochlorite dressings in 76% of the cases, this proves that it is an effective topical antibiotic. Hence it can be concluded that sodium hypochlorite dressings are an effective and cheap alternative to conventional dressings when treating patients of lower socio economic strata.

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