



A COMPARATIVE STUDY OF IONIC SILVER GEL DRESSINGS VERSUS SALINE DRESSINGS IN ULCER MANAGEMENT.

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ABSTRACT

BACKGROUND: The trends in the management of ulcers have been changing over the years with the introduction of newer topical preparations and skin substitutes. One such novel preparation is ionic silver in hydrogel preparations. We propound our experience of ionic silver preparations in the management of various ulcers in our patients.

MATERIALS AND METHODS: The present case control prospective study was conducted at Department of General Surgery, NRI Medical College & Hospital, Guntur. All patients presented with ulcer between November 2015 & December 2016 were studied. Ionic silver gel dressings were done after thorough cleaning of the wound with normal saline.

RESULTS: Total number of cases studied were 70. Case and control groups were equally distributed, 35 in each. Mean time taken for the small ulcers to heal spontaneously was 7 days in the silver group (n=11) and 11.73 days in the control group (n=11). Mean time taken for medium ulcers to heal spontaneously was 9.12 days in the silver group (n=10) and 15.9 days in the control group (n=10). Mean time taken for medium sized ulcers to become fit for grafting was 10.4 days in the silver group (n=8) and 17.25 days in the control group (n=8). Mean time taken for the large ulcers to become fit for grafting was 10.75 days (n=6) and 19.87 days in the control group (n=6). 28 cases became fit for grafting and SSG was done.

CONCLUSION: Healing of ulcers is faster with ionic silver gel dressings when compared to saline dressings. Duration of hospital stay is less for patients on ionic silver dressings. More number of ulcers from the ionic silver group became fit for skin grafting much earlier.

KEYWORDS : Wound healing, silver gel, ionic silver

Introduction

Nanocrystalline silver (crystals <20 nm) can deliver topical concentrations to the superficial compartment that are effective against a range of organisms, including yeast.^{4,8} Silver-based wound dressings are often used to prepare the wound for healing and from that perspective silver products may have a definite positive effect on wound healing and may be used to maintain a microbe-free, moist wound healing environment. Silver-based technologies in particular provide added benefits by down-regulating MMPs to levels that facilitate wound healing.⁹ Silver ions also display low levels of toxicity to humans and are safe agents for the removal of biofilms.^{2,7} Ionic silver dressing combined with gel is efficacious to treat the dog bite wounds in clinical practice, and no obvious side effect occurs. Dressings with hydro fibers avoid the accumulation of secretions for bacterial growth which would compromise tissue repair.⁵

Material and methods

The present case control prospective study was conducted at Department of General Surgery, NRI Medical College & Hospital, Chinnakakani. Cases were defined as patients who are given ionic silver gel dressings and controls were defined as patients who are given saline dressings. For study purpose, ulcers were classified, based on size, as small, medium and large measuring less than 5cm, 5 to 10 cm and more than 10cm respectively. Ionic silver gel dressings were done after thorough cleaning of the wound with normal saline and the wound was covered with appropriate secondary dressing such as sterile gauze or cotton.

INCLUSION CRITERIA

1. All patients above 18yrs of age
2. All ulcer cases that became culture negative with repeated debridement and antiseptic dressings and started showing granulation tissue.

EXCLUSION CRITERIA

1. All patients below 18yrs of age.

Results

Case and control groups were equally distributed, 35 in each. Maximum number of patients in the study were between 61 and 70

years (22/70, 31.4%). In our study there were more number of male patients than female patients (58/12, 82.8% / 17.2%). Most of the ulcers studied were located on the lower limbs (62/70, 88.6%), followed by upper limbs (5.7%), trunk (4.3%), head & neck (1.4%) [Figure 1]. Based on size, there were 22 small-sized, 36 medium sized and 12 large-sized ulcers, equally distributed in both groups [Figure 2]. Based on etiology, there were 42 diabetic

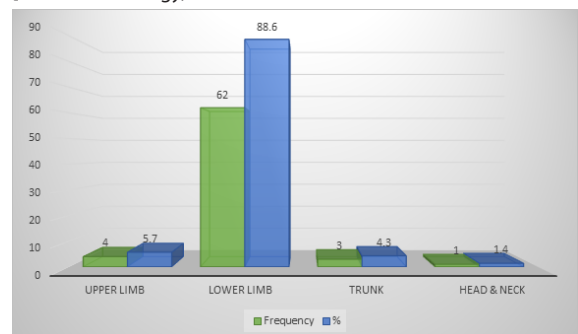


Figure 1: Bar graph showing distribution of the ulcers according to the site

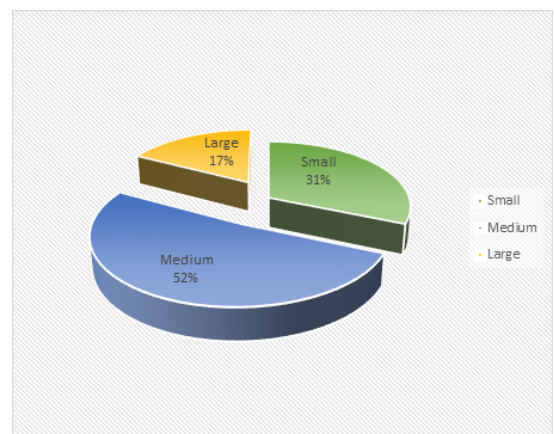


Figure 2: Pie chart showing the distribution of ulcers according to size

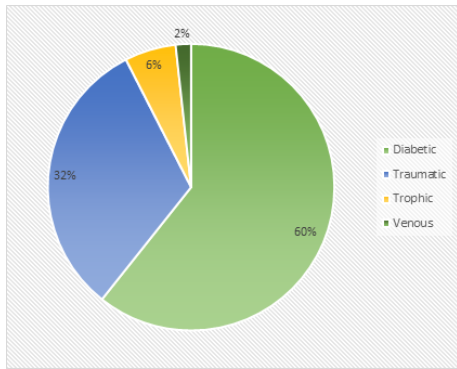


Figure 3: Pie chart showing the distribution of ulcers based on etiology

foot ulcers, 22 traumatic ulcers 4 trophic and 2 venous ulcers [Figure 3]. In 21 patients, 7 patients were anemic, 13 had associated neurovascular deficits and 1 patient was hepatitis B positive. Mean time taken for the small ulcers to heal spontaneously was 7 days in the silver group (n=11) and 11.73 days in the control group (n=11) [Table 1]. Mean time taken for medium ulcers to heal spontaneously was 9.12 days in the silver group (n=10) and 15.9 days in the control group (n=10) [Table 1]. Mean time taken for medium sized ulcers to become fit for grafting was 10.4 days in the silver group (n=8) and 17.25 days in the control group (n=8) [Table 2]. Mean time taken for the large ulcers to become fit for grafting was 10.75 days (n=6) and 19.87 days in the control group (n=6) [Table 2].

Table 1: Mean Time Taken For Spontaneous Healing

ULCER	Ag+ Group (in days)	Control Group (in days)
Small sized (n=22)	7	11.73
Medium sized (n=20)	9.12	15.9

Table 2: Time Taken For Ulcers to Become Fit For Grafting

Ulcer	Ag+ Group (in days)	Control Group (in days)
Medium sized (n=16)	10.4	17.25
Large sized (n=12)	10.75	19.87

28 cases became fit for grafting 14 patients in either group, in the silver group 3 diabetic and 5 traumatic medium sized ulcers, 5 diabetic and 1 traumatic large sized ulcers, in the control group 6 diabetic and 1 traumatic medium sized ulcers, 3 diabetic and 3 traumatic large sized ulcers.

Discussion

Most of our patients were in the extreme old age group, i.e. between 61 and 70 years, in whom wound healing is hampered by various factors especially their age related factors. The most common etiology of the ulcers was diabetes mellitus(60%) followed by trauma (32%). There are 4 trophic ulcers and 2 venous ulcers. Accordingly there were 22 small-sized, 36 medium-sized and 12 large-sized ulcers. Majority of the ulcers studied were located in the lower limbs in the foot and ankle regions (88.6%). Apart from the etiological factors of ulcers, factors that interfere with normal wound healing, anemia (in 7 patients), neurovascular deficiency (in 13 patients) and immunosuppression (Hepatitis B, 1 patient) were identified and the reversible factors were treated alongside, so that these factors do not greatly influence the outcome.

Mean time taken for the small ulcers to heal spontaneously was 7 days in the silver group and 11.73 days in the control group. Mean time taken for medium ulcers to heal spontaneously was 9.12 days in the silver group and 15.9 days in the control group [Figure 4]. The

remaining ulcers were too large to heal spontaneously, so required split skin grafting. We had observed that the ulcers treated with ionic silver gel dressings became fit for skin grafting much earlier - wound granulation tissue became more reddish and extensive -than the control group. Mean time taken for medium sized ulcers to become fit for grafting was 10.4 days in the silver group and 17.25 days in the control group. Mean time taken for the large ulcers to become fit for grafting was 10.75 days and 19.87 days in the control group [Figure 5]. Eventually all 28 patients who became fit for skin grafting underwent successful skin grafting.

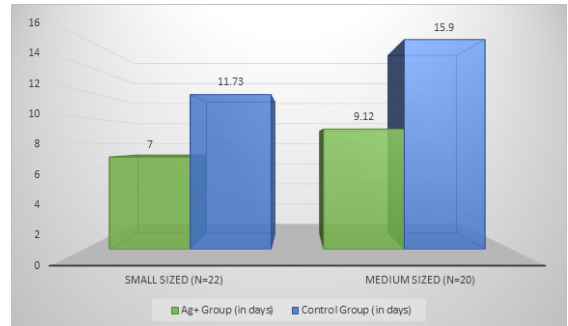


Figure 4: Bar graph comparing the time taken for spontaneous healing of the small and medium sized ulcers between the ionic silver group and the control group.

Hence ionic silver gel dressings enhance the rate of healing of the ulcers. Apart from enhancing the healing rate, the patients' duration of stay in the hospital was considerably reduced and the patients' expenditure during the hospital stay, including the expenditure incurred for his everyday amenities, was also reduced. Hui M et al, published that the average wound healing period in the silver gel treatment group was significantly shorter than that in the control group ($P < 0.05$). Furthermore, the difference value of healing area in the treatment group was significantly higher than that in the control group ($P < 0.05$) at days 10 and 17. Wound granulation was colored darkly when ionic silver dressing was applied,

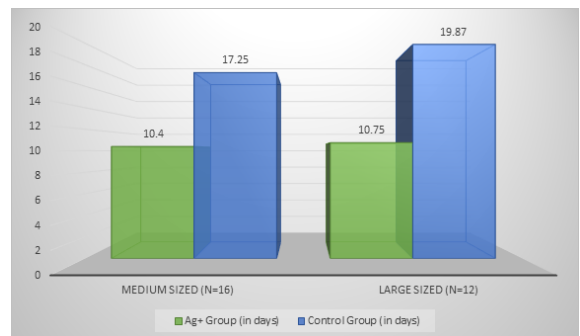


Figure 5: Bar graph comparing the time taken for the medium and large sized ulcers to become fit for skin grafting between the ionic silver group and the control group.

and extensively grew when gel was applied in the treatment group, no complaints of the patients or pain on the dressing removal was found, without granulation injury. In the control group, the pain on the dressing removal was observed, the granulation tissue was injured at different degrees, without any side effect. During follow-ups, neither wound relapse nor hydrophobia symptom was found, only accompanied with the local pigmentation and skin scars.³

Conclusion

Healing of ulcers is faster with ionic silver gel dressings when compared to saline dressings. Duration of hospital stay is less for patients on ionic silver dressings. More number of ulcers from the ionic silver group became fit for skin grafting and that too much earlier. However we are unable to comment on which type of ulcer, based on etiology, responds well to ionic silver dressings and further

studies are required to find out the efficacy of ionic silver dressings in vascular ulcers.

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