



EFFICACY OF DERMABRASION IN THE TREATMENT OF LOWER EXTREMITY ULCERS - A PROSPECTIVE STUDY.

Surgery

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ABSTRACT

BACKGROUND: Management of extremity ulcers is a topic of great interest. Some of the basic methods of managing ulcers can be listed as revascularization, debridement of non-viable tissues, reduction of edema, appropriate dressing, antibiotics when necessary, control of co-morbidities, close wounds surgically with grafts or flaps. Debridement prepares the wound for healing by reducing the bioburden. Without an adequate debridement, a wound is persistently exposed to cytotoxic stressors and competes with bacteria for scarce resources such as oxygen and nutrients. Dermabrasion is a tool in the management of dermatological conditions like post-acne scarring, naevi, adenoma sebaceum and also in the management of burns. In this study the use of dermabrasion as a debridement tool in the management of ulcers has been evaluated.

OBJECTIVE: To compare the outcome of dermabrasion with the conventional method in terms of Assessment of Wound healing, No of days of Hospital stay and pain during the procedure

METHODOLOGY: From Oct 2012 to May 2017 patients presenting to outpatient clinic or admitted into the hospital (M S Ramaiah Hospitals) with an lower extremity ulcer were recruited into the study.

RESULT: In this study, mean ASEPSIS scores was 47.78 ± 2.208 in the conventional group (CG) and in the trial group (TG) 47.49 ± 2.210. No statistically significant difference was noted between the groups in terms of Wound scores ($p=0.331$). In this study the mean VAS scores was 4.95 ± 1.079 in the CG and in TG it was 2.60 ± 1.047 ($p<0.05$). Mean duration of hospital stay was 13.33 ± 4.397 days in TG and in the CG it was 12.22 ± 4.837 days.

CONCLUSION: Dermabrasion reduces the pain during the procedure significantly, promotes granulation and decreases the healing time without damaging the normal tissue or producing complications.

KEYWORDS

Wound Healing, Ulcer, Lower Extremity, Dermabrasion, Debridement

INTRODUCTION

Wound is a microcosm of the patient. Most wounds heal with minimal intervention in a healthy individual. A wound heals in an orderly set of stages and in a predictable amount of time [1]. Acute and chronic wounds are at opposite ends of a spectrum of wound healing types that progress toward being healed at different rates [2]. Wounds cause patients severe emotional and physical stress as well as creating a significant financial burden on patients and the whole healthcare system. Chronic wounds mostly affect people over the age of 60 [3]. The incidence is 0.78% of the population and the prevalence ranges from 0.18 to 0.32% [4]. As the population ages, the number of chronic wounds is expected to rise [1]. The key to successful wound healing is meticulous wound care and the optimization of wound healing capacity.

India alone currently counts over 35 million people with diabetes, which is estimated to touch 73.5 million by 2025 [5] (Worldwide annually more than one million amputations done of these 70 % are due to diabetes). Infection is one of the most important factors in determining the risk of amputation in patients with diabetes [6]. If a standardized treatment is applied with a multidisciplinary foot care team, major amputation can be avoided in about 80-90% and in 95% of patients with infection [7].

Management of ulcers is a topic of great interest. Some of the basic methods of managing ulcers can be summarized as Debridement of non-viable tissues, reduction of edema, appropriate dressing, Antibiotics if necessary, Control of co-morbidities, Close wounds surgically with grafts or flaps [8]. Debridement prepares the wound for healing by reducing the bioburden. Without an adequate debridement, a wound is persistently exposed to cytotoxic stressors and competes with bacteria for scarce resources such as oxygen and nutrients. Dermabrasion is most often used to improve the look of facial skin left scarred by accidents or previous surgery, or to smooth out fine facial wrinkles. It's also sometimes used to remove the pre-cancerous growths called keratoses and is also commonly used to treat deep acne scars. Dermabrasion activates a dermal remodeling/wound healing cascade with minimal epidermal disruption. Dermabrasion is a tool in the management of dermatological conditions like post-acne scarring, naevi, adenoma sebaceum and also in the management of burns [9]. In this study the use of dermabrasion as a debridement tool in the management of ulcers shall be evaluated.

METHODOLOGY

This is a prospective study conducted on 110 patients (55 conventional group, 55 trial group) attending surgical outpatient clinic or admitted in M S Ramaiah Hospital, during the study period of October 2012 to May 2017. Patients included in the study were patients between 20-80 years and all patients having ulcers lower extremities attending surgical outpatient clinic or admitted to the wards with an ulcer. These patients were grouped into two groups, conventional and trial groups who were treated with conventional and dermabrasion wound treatment respectively. A detailed history and clinical examination was done and patients were randomly put into conventional and trial groups as mentioned above. Relevant investigations were done. Conventional Group (CG) patients were subjected to standard conventional treatment for ulcers existing in our hospital setup i.e.; antibiotics, regular cotton gauze with betadine dressings, occasional mechanical debridement as required. Trial Group (TG) patients received all the components of standard treatment except for conventional debridement which was replaced by Dermabrasion done on alternate days. Informed consent was obtained from the patients. Device: Dermabrasion is done using high-speed rotating head dermabrader with 4200 rpm. The wound healing was assessed and quantified using the ASEPSIS scores [10-12], which is a scoring method for wound infections. Based on the ASEPSIS wound score (table 1), wound healing was quantified by a blinded investigator from postoperative days 3, 7, 11 and 15.

Visual analogue scale (VAS) was used for the assessment of pain before and after the procedure and was compared to the conventional method. It is a 10 cm line grading pain from NO pain to WORST pain as experienced by the patient [13]. Patients of both the groups were followed up every week up for the first month and there after once in 15 days up to 3 months or till the wound was completely healed or flap/grafting is done whichever is earlier.

The outcome parameters between the two groups were Assessment of Wound healing, No of days of hospital stay and Pain during the procedure. Quantitative parameters such as Age, Sex, Duration of wound, ASEPSIS scores, Visual Analogue Scale score, Duration of hospital stay were summarized between the two groups in terms of Mean and Standard Deviation (as a measure of variation). Differences in mean scores between the two groups of patients who were treated either with conventional treatment or dermabrasion were tested for

significance by employing Student's t test or appropriate non parametric test of significance. Incidence of wound healing disorders were estimated as proportion in each of the group and differences in the proportion were tested for statistical significance by employing 'Z' test or Chi-square test of significance. Chi square test or Fisher Exact test was used to find the significant association of study characteristics between conventional and trial groups and Student t test (independent, two tailed) was used to find the significance of wound size between two groups and paired t test was used to find the significance of wound size before and after. The Statistical software namely SAS 9.2, SPSS 18.0, Stata 10.1, MedCalc 9.0.1, Systat 12.0 and R environment ver.2.11.1 were used for the analysis of the data and Microsoft word and Excel were used to generate graphs, tables etc.

RESULTS

The patients in both the groups were selected prospectively. In the study 27% were in the age group between 51 to 60 years. In the trial group (TG) 22% and 31% in the conventional group (CG) were in the age group of 51-60 years. Mean age was 49.91 13.187 in the TG and 52.36 13.083 in the CG. 63 males and 47 females were included in the study. 54.5% of TG were males, 45.45% were females. In the CG 60% were males and 40% were females. 34.5% patients from the CG and 41.8% from TG had co-morbidities. Both the groups are comparable in terms of demographic variables like age, gender and co morbidities. Mean duration of hospital stay was 13.33 4.397 days in the TG and in CG it was 12.22 4.837 days.

Majority, 80% of the patients from the TG had a VAS score of 1-3. Whereas in the CG, 85.45% patients had a VAS score of 4-6. This difference in the two groups was statistically significant, p value <0.05 (0.002). Mean VAS scores was 4.95 1.079 in the CG and in the TG it was 2.60 1.047. Mean WOUND scores was 12.91 2.180 in the CG and in TG it was 12.45 2.193. No statistically significant difference was noted between the 2 groups in terms of Wound scores (p=0.169). In this study the Mean ASEPSIS scores was 47.78 2.208 in the CG and in the TG it was 47.49 2.210. No statistically significant difference was noted between the 2 groups in terms of Wound scores (p=0.331).

On follow-up, at the end of 15 days, 1 month and 3 months, TG had 85%, 78% and 24% healing ulcers, 4%, 9% and 62% had healed ulcers respectively. 11% were lost in follow up and 3% were taken up for definitive surgery during the course of the follow-up. CG on follow-up at the end of 15 days, 1 month and 3 months, TG had 73%, 64% and 15% healing ulcers, 5%, 11% and 58% had healed ulcers respectively. 18% were lost in follow up and 9% were taken up for definitive surgery during the course of the followup. There is no statistical difference between the two groups on following the patients for up to 3 months.

DISCUSSION

Most common age group affected in the study were in the age group between 51 to 60 years. In this study the mean age group was 49.91 13.187 in the trial and in the conventional groups the mean age in years was 52.36 13.083. Both the groups are comparable with age. A study undertaken in the USA in 2004 through the 2002 National Hospital Discharge Survey, evaluated 275,000 in patient records from 500 hospitals from 1996 onwards. This study revealed that elderly had twice the risk of developing an ulcer [14].

Dumfarth et al. indicated that the incidence of wound healing disorders in the conventional treatment group was 22% as compared with the shock wave therapy group 4% [7]. In this study the mean ASEPSIS scores was 47.78 2.208 in the CG and in TG it was 47.49 2.210. No statistically significant difference was noted between the two groups in terms of Wound scores (p=0.331) in our study, the results from both the groups are comparable in terms of wound healing rates. They also showed tissue effects were seen with Low-energy shock wave therapy (SWT) improves healing of diabetic and vascular ulcers by over expression of vascular endothelial growth factor and down regulation of necrosis factor κ B. Higher incidence of wound healing disorders necessitating antibiotic treatment in the control group 22% as compared with the SWT group 4% was observed [15].

Shehadi et al in their study showed that dermal thickness was increased by as much as 40% in the thinner skin and by 27% in the thicker skin. Similarly, the increase in collagen-bundle thickness was 22%, whereas the increase in the epidermal thickness was 9% [14]. Dermabrasion appears to be a procedure that can produce changes in dermal matrix constituents and result in improvement in skin contour irregularities

[16, 17]. Thickening of the epidermis and dermis, flattening of the rete pegs, vascular ectasia and perivascular inflammation, and hyalinization of the papillary dermis with newly deposited collagen and elastic fibers were observed [18]. Dermal thickness was increased by as much as 40% in the thinner skin and by 27% in the thicker skin. Similarly, the increase in collagen-bundle thickness was 22%, whereas the increase in the epidermal thickness was 9% [19].

The pain during the procedure was found to be significantly reduced when compared to the conventional debridement group. Pain was assessed using Visual Analogue Scale (VAS). In this study the mean VAS scores was 4.95 1.079 in the conventional group and in the trial it was 2.60 1.047. The p<0.05 makes it statistically significant and hence Dermabrasion has the benefit of being minimally painful in comparison with the conventional treatment. In this study the mean duration of hospital stay was 13.33 4.397 days in the trial and in the conventional group it was 12.22 4.837 days. The results from both the groups are comparable in terms of In-hospital stay. Dermabrasion has similar results that are comparable to Conventional debridement in the management of ulcers.

CONCLUSION

Results from the present study show that in the management of lower extremity ulcers, dermabrasion reduces the pain during the procedure significantly, promotes granulation and decreases the healing time though statistically not significant, without damaging the normal tissue or producing complications. The minimal pain and minimum damage to the healthy granulation tissue with the use of dermabrasion makes it a good choice for ulcer management with comparable results. However, mechanism of wound healing/ promotion of granulation tissue are unclear and cannot be made out in this study, larger randomized trial coupled with biochemical analysis can throw some light on this aspect. Dermabrasion has similar results that are comparable to conventional mechanical debridement in the management of ulcers.

Table 1: ASEPSIS score

Criterion Points	
Additional treatment	
Antibiotics for wound infection	10
Drainage of pus under local anaesthesia	5
Debridement of wound under general anaesthesia	10
Serous discharge	0-5
Erythema	0-5
Purulent exudates	0-10
Separation of deep tissues	0-10
Isolation of bacteria from wound	10
Stay as in-patient prolonged over 14 days as result of wound infection	5

Figure 1: Comparison of VAS scores

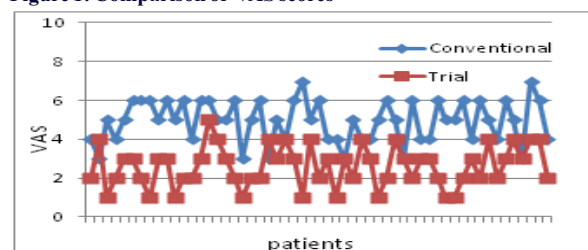
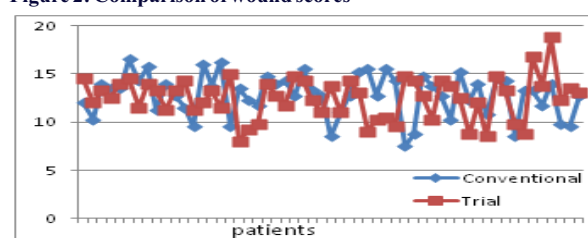


Table 2: Comparison of ASEPSIS SCORE

	Range	Mean	Stddeviation
Conventional	42-52	47.78	2.208
Trial	43-54	47.49	2.210

Figure 2: Comparison of wound scores



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