European Journal of Molecular & Clinical Medicine

ISSN 2515-8260 Volume 09, Issue 04, 2022

Original Research Article

An evaluation of the effectiveness of dermabrasion in the treatment of external ulcers using a randomized controlled trial

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Abstract

Background: Management of ulcers is a significant topic. Debridement of non-viable tissues, edema reduction, adequate dressing, and antibiotics if needed are fundamental ulcer management treatments. Disease control, Cover wounds with grafts or flaps. Bioburden is reduced via debridement to prepare the wound for healing. Without debridement, a wound is exposed to cytotoxic stimuli and competes for oxygen and nutrients with pathogens. Dermabrasion treats post-acne scars, naevi, sebaceous adenomas, and burns.

Aim & Objectives:

1. In this investigation, dermabrasion will be used to debride ulcers. Assess the usefulness and consequences of dermabrasion in ulcer care.
2. To compare dermabrasion to traditional treatment.
3. Assess wound healing.
4. Days in hospital Incision pain.

Materials and Methods: From the 120 patients presenting to outpatient clinic or admitted into the hospital with an ulcer on the extremity were recruited into the study.

Results: The mean VAS scores in this study were 5.11 ±1.31 in the conventional group and 2.52 1.089 in the trial group. The mean WOUND scores in this study were 13.97± 2.026 in the conventional group and 12.13 ±2.901 in the trial group. In terms of Wound scores, there was no statistically significant difference between the two groups (p=0.139). The mean ASEPSIS scores in this study were 47.89± 2.091 in the conventional group and 45.42 ±2.29 in the trial group. In terms of Wound scores, there was no statistically significant difference between the two groups (p=0.301).

Conclusion: Dermabrasion dramatically reduce discomfort during the surgery, enhances granulation and shortens healing time without injuring normal tissue or causing problems.

Keywords: Dermabrasion, wound healing, chronic ulcers, Wound scores, ASEPSIS scores

ISSN 2515-8260 Volume 09, Issue 04, 2022

Introduction

The process of dermabrasion involves the use of abrasive materials to cause injury to the epidermis and dermis of the skin. This causes the skin to mend in a way that improves the appearance of the skin. A tissue's continuity is broken, typically as a result of some kind of external force, and this results in a wound. However, any tissue, including nerves, bones, or organs, could be involved. The skin is most commonly afflicted. The patient's wound can be thought of as a microcosm [1]. When a healthy person sustains a wound, it will typically heal with minor medical intervention. On the other hand, the prevalence of wounds that do not heal and wounds that heal more slowly is higher in patients who suffer from systemic disorders, particularly those who are hospitalized [2].

Ulcers can be caused by a number of different things. 80-90% of the cases are caused by venous insufficiency, 5% are caused by arterial insufficiency, and the remaining 5% are caused by a combination of arterial and venous insufficiency [3]. Only about 1% of ulcers are caused by one of the many disorders, and diabetes is responsible for about 2% of all ulcers. Non-therapeutic ulcers are difficult to treat, can result in time missed from work, and are typically both chronic and recurrent. Leg ulcers affect about 2% of the population in developed countries. Ulcer patients have a lower quality of life than age-matched controls due to the persistent pain, unpleasant odour, and decreased mobility caused by their condition. Reconstruction or repair of a deficiency in an organ or tissue, most frequently the skin [2, 4]. In directive for a wound to heal, there must be a complicated interplay between the epidermal and dermal cells, the extracellular matrix, regulated angiogenesis, and plasma-derived proteins. This interaction must be directed by a variety of cytokines and growth factors. It is a dynamic process and a complicated set of events that begin at the moment of the injury and can continue for months to years after that. The injury is the starting point for the process. This dynamic process is traditionally broken down into three phases that overlap with one another: inflammation, proliferation, and remodeling. A wound will heal in a methodical progression of stages and in a time frame that can be accurately predicted [5]. Acute wounds and chronic wounds are at opposite extremes of a continuum of wound healing types that advance toward being healed at varying rates. Acute wounds tend to heal more quickly than chronic wounds [2]. It would appear that the healing process for chronic wounds is getting stuck in one or more of its phases. Chronic wounds, for instance, frequently spend an excessive amount of time in the inflammatory stage [2, 4]. A delicate equilibrium exists between the creation and degradation of molecules like collagen in acute wounds. However, in chronic wounds, this equilibrium is disrupted, and degradation plays an excessively significant role [5, 6]. Wounds that are considered chronic may never heal or may take many years to do so. These wounds not only put patients under a substantial amount of mental and physical strain, but they also place a significant financial burden not only on individuals but on the entire healthcare system. Chronic wounds are most common in patients older than sixty years old [6]. The incidence is 0.78% of the population, while the prevalence ranges from 0.18 to 0.32% of the population [7]. It is anticipated that the number of patients suffering from chronic wounds will increase as the population ages [4]. Wounds can only heal well if they are meticulously cared for, and their healing potential should be enhanced whenever possible. If a wound does not receive a proper debridement, it will continue to be subjected to cytotoxic stress and will be in competition with microorganisms for scarce resources such as oxygen and nutrients. Debridement helps to prepare the wound for healing by removing Bioburden [8, 9]. A wound that has not been properly debrided is constantly exposed to cytotoxic stimuli and competes with bacteria for few resources such as oxygen and nutrients [6, 7]. Dermabrasion is a method used in the treatment of dermatological disorders such as post-acne scarring, naevi, adenoma sebaceum and burns. This study will look at how useful dermabrasion is as a way to remove dead skin when treating ulcers.

ISSN 2515-8260 Volume 09, Issue 04, 2022

Aims and Objectives

1. To assess the usefulness and effects of dermabrasion in the management of ulcers.
2. To compare the outcome of dermabrasion with the conventional method.

a. Assessment of Wound healing.
b. No. of days of Hospital stay.
c. Pain during the procedure.

Materials & Methods

Source of patients

This is a prospective study of 120 patients (65 in the conventional group and 55 in the experimental group) who attended surgical outpatient clinics or were hospitalised in surgical wards over a study period of one year. This study's participants include all people who have ulcers on their extremities. Randomization is accomplished by assigning random numbers to all patients, who are then divided into two groups, CONVENTIONAL and TRIAL, and treated with conventional and dermabrasion wound treatment, respectively. The study included all patients who presented to the hospital with ulcers or who developed ulcers after debridement. Patients were randomly assigned to the CONVENTIONAL and TRIAL groups after a complete history and clinical examination. Relevant investigations have been conducted. Patients in the conventional group received normal conventional care for ulcers in our hospital setup, which included antibiotics, regular cotton gauze with betadine dressings, and sometimes mechanical debridement as needed. Trial Group participants got all the usual therapy components except conventional debridement, which was substituted by dermabrasion on alternating days. The patients provided informed consent. Dermabrasion is performed with a 4200rpm high-speed rotating head dermabrader. Wound Assessment: Wound healing will be examined and quantified using the ASEPSIS score [12-14], which is a wound infection grading tool. A blinded investigator assessed postoperative wound healing using the ASEPSIS wound score.

Table 1: The ASEPSIS WOUND score [6, 7]

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

Pain evaluation: A visual analogue scale (VAS) is utilised for the evaluation of pain both before and after the procedure, and it is compared to the traditional way of pain evaluation. It is a line that is 10 centimeters long and ranges from no pain to the patient's worst pain, which is 15.

Follow-up: Patients in both groups were checked on once a week for the first month, and then once every 15 days for the following three months or until the wound was completely healed, whichever came first. If the wound healed faster than expected, then flap or grafting procedures were performed.

Inclusion criteria: All patients with ulcers in their upper or lower extremities who are attending a surgical outpatient clinic or have been admitted to the wards with an ulcer, with an age limit of 21-80 years.
Patients who had fewer than two weeks left of their therapy term, patients suffering from anaemia, hypoproteinemia, chronic steroid use, malnourishment, and cancer were excluded from the study.

Results

Table 2: Age-wise Distribution of the Study Group

Age in years	Conventional		Trial		Total	
	No	%	No	%	No	%
21-30 yrs	4	6.15%	6	9.23%	10	8.33%
31-40 yrs	15	23.0%	12	21.81%	27	22.5%
41-50 yrs	11	16.92%	13	23.63%	24	20.0%
51-60 yrs	17	26.15%	10	18.18%	27	22.5%
61-70 yrs	13	20.0%	12	21.81%	25	20.83%
70-80 yrs	5	7.69%	2	3.63%	7	5.83%
Total	65	100.00%	55	100.00%	120	100.00%

Patients in both groups were selected at random. In the study, 22.5% of the participants were between the ages of 51 and 60. 18.18% of those in the trial group and 26.15% of those in the control group were between the ages of 51 and 60.
The mean age group in this study was 47.4 ±11.56 years in the trial and 55.6 ±12.75 years in the conventional groups. In terms of age, both groups are comparable. There were 68 males and 52 females in this study. Males made up 56.66% of the trial group, while females made up 43.33%. The typical group consisted of 64% males and 36% females. The mean ulcer diameters of both study groups were comparable. Co-morbidities were present in 38.44% of the conventional group and 44.8% of the experimental group in this investigation. Both groups were comparable to one another. The mean duration of hospital stay in this study was 16.55 ±5.8 days in the trial and 14.22 ±5.4 days in the control group.

Table 3: Comparison of Mean VAS (Visual Analogue Scale) SCORE

	Range	Mean	Std. deviation
Conventional	3-7	5.11	1.31
Trial	1-5	2.52	1.089

In this study the mean VAS scores were 5.11± 1.31 in the conventional group and in the trial it was 2.52 ± 1.089.

Table 4: Comparison of WOUND SCORE

	Range	Mean	Std. deviation
Conventional	8-16	13.97	2.026
Trial	8-19	12.13	2.901

In this study the mean WOUND scores were 13.97 ± 2.026 in the conventional group and in the trial it was 12.13 ± 2.901. No statistically significant difference was noted between the 2 groups in terms of Wound scores (p=0.137).

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Table 5: Comparison of ASEPSIS SCORE

	Range	Mean	Std. Deviation
Conventional	42-52	47.89	2.091
Trial	43-54	45.42	2.290

In this study the mean ASEPSIS scores was 47.89 ± 2.091 in the conventional group and in the trial it was 45.42 ± 2.29. No statistically significant difference was noted between the 2 groups in terms of Wound scores (p=0.301).

Table 6: Comparison of Mean Ulcer sizes in study population

Group	n	Mean	Std. Deviation	Maximum	Minimum
Conventional	55	25.03	22.09	92.07	5
Trial	55	22.91	14.92	64	2.98

Mean Ulcer sizes of both groups of the study population were comparable. In this study the mean Ulcer sizes scores was 25.03 ± 22.09 in the conventional group and in the trial it was 22.91 ± 14.92. No statistically significant difference was noted between the 2 groups in terms of Wound scores (p=0.301).

Table 7: Comparison of Co-morbidities

Co morbidities	Conventional		Trial	
	n	%	n	%
Present	22	18.34	25	20.83
Absent	38	31.66	35	29.67

In this present study, co-morbidities affected 31.66% of patients in the conventional group and 29.67% of patients in the trial group. Both groups were similar to one another in a number of aspects.

With the follow-up assessment of wound healing status in both the trial and conventional groups the following observations were made.

1. **First follow-up:** At the conclusion of the first follow-up, 81% of patients had ulcers that were healing, 7% of patients had ulcers that were totally healed, 10% of patients were lost in follow-up and 2% of patients underwent definitive surgery.
   71% of people in the Trial group had ulcers that were healing at the end of the first follow-up, 6% of people had ulcers that were entirely healed, 18% of people were lost in follow-up and 5% of people were brought up for definitive surgery.
2. **Second follow-up:** At the conclusion of the second follow-up, 78% of patients in the Conventional group had ulcers that were healing, 10% of patients had ulcers that had totally healed, 11% of patients were lost in follow-up, and 3% of patients were brought up for definitive surgery. In the Trial group, 71% of patients had ulcers that were healing at the end of the second follow-up, 11% of patients had ulcers that were totally healed, 15% of patients were lost in follow-up, and 3% of patients underwent definitive surgery.
   In the conventional treatment group, at the end of the second follow-up, sixty percent of patients had ulcers that were healing, twelve percent of patients had ulcers that had totally healed, nineteenth percent were lost in follow-up, and nine percent were brought up for definitive surgery.
3. **Third follow-up:** At the end of the third follow up in the Trial group, sixty percent of the patients had ulcers that were healing, twenty one percent of the patients' ulcers were completely healed, thirteen percent of the patients were lost in follow up, and six percent of the patients were taken up for definitive surgery.57% of patients in the conventional

group had ulcers that were healing at the end of the third follow-up, 20% of patients had ulcers that were totally healed, 19% of patients were lost in follow-up, and 8% of patients were brought up for definitive surgery.

4. **Fourth follow-up:** At the conclusion of the fourth follow-up in the Trial group, 42% of patients had ulcers that were healing, 40% of patients had ulcers that were totally healed, 13% of patients were lost in follow-up, and 5% of patients were brought up for definitive surgery. In the conventional treatment group, at the conclusion of the fourth follow-up period, 26% of patients had ulcers that were healing, 45% of patients had ulcers that were totally healed, 21% of patients were lost in follow-up, and 8% of patients were brought up for definitive surgery.
5. **The fifth follow-up:** At the conclusion of the fifth follow-up, 20% of patients in the Trial group had ulcers that were healing, 65% of patients had ulcers that had totally healed, 12% of patients were lost in follow-up, and 3% of patients were taken up for definitive surgery.

   18% of patients in the conventional group had ulcers that were healing at the end of the fifth follow-up, 53% of patients' ulcers were totally healed, 19% of patients were lost in follow-up, and 10% of patients underwent definitive surgery.

Discussion

Dermabrasion has long been used to treat a wide range of dermatological disorders, including facial skin resurfacing and scar revision. Dermabrasion has found a niche in the treatment of acne and traumatic face scars, as well as in cosmetic facial rejuvenation [8].

Small, portable hand-held dermabraders with rotating speeds of 18 000-35 000 revolutions per minute are the most popular models available today. End parts, such as wire brushes, diamond fraises, and serrated wheels, are attached to the dermabrader's end to enable for accurate resurfacing and treatment [5, 7].

To ensure optimal outcomes with the dermabrasion technique, as with all cosmetic surgical operations, proper patient selection and room setup (with adequate lighting and monitoring equipment) are required. Patients must be aware of the potential dangers, advantages, and limitations of the procedure.

Dermabrasion is technique-dependent and the surgeon should be well-versed in it before administering this procedure. To designate the areas to be treated, gentian violet solution is utilised. Prior to the treatment, refrigerant topical anaesthetic is administered to freeze the skin. The dermabrasion process is performed in a normal manner, holding the skin taut and treating one anatomic unit at a time [6, 7].

Patients may have an open or closed dressing scheme after surgery. Postoperative medical therapy is also advised, including the use of antiviral, antibiotic, and corticosteroid medications. The re-epithelialization process normally takes 5-7 days, and residual erythema might last up to 4 weeks. Following dermabrasion, it is critical to use adequate sun protection.

Based on the previously specified inclusion and exclusion criteria, a total of 120 patients with ulcers attending surgical outpatient clinic or admitted to HOSPITAL were recruited into the study. Patients in both groups were chosen at random [6].

According to Hosyal D, the patients in both groups were chosen at random in the study. In the study, 27% of the participants were between the ages of 51 and 60. 22% of those in the trial group and 31% of those in the control group were between the ages of 51 and 60 [5].

In the Madhuri V study, 25% of the participants were between the ages of 51 and 60. 22.2% of those in the trial group and 31% of those in the control group were between the ages of 51 and 60 [6].

The mean age group in the Madhuri V study was 48.3 ±12.17 in the trial and 53.26± 14.23 in the conventional groups. In terms of age, both groups are comparable. In terms of age, both

ISSN 2515-8260 Volume 09, Issue 04, 2022

groups are comparable. A research conducted in the United States in 2004 through the 2002 National Hospital Discharge Survey examined 275,000 patient records from 500 institutions dating back to 1996. According to this study, the elderly have twice the risk of acquiring an ulcer [6].

In this study, 22.5% of the participants were between the ages of 51 and 60. 18.18% of those in the trial group and 26.15% of those in the control group were between the ages of 51 and 60. The mean age group in this study was 47.4 ±11.56 years in the trial and 55.6± 12.75 years in the conventional groups. In terms of age, both groups are comparable. There were 68 males and 52 females in this study. Males made up 56.66% of the trial group, while females made up 43.33%. The typical group consisted of 64% males and 36% females.

According to Dumfarth *et al*., the incidence of wound healing abnormalities was 22% in the standard treatment group versus 4% in the shock wave therapy group [9].

In the Madhuri V study, the mean ASEPSIS scores were 47.78 2.208 in the conventional group and 47.49 ±2.210 in the trial group. There was no statistically significant difference between the two groups in terms of wound scoring (p=0.331) in the study, and the wound healing rates for both groups were comparable [6]. The mean WOUND scores in this study were 13.97 2.026 in the conventional group and 12.13 ±2.901 in the trial group. In terms of Wound ratings, there was no statistically significant difference between the two groups (p=0.137).

Low-energy shock wave therapy (SWT) improves healing of diabetic and vascular ulcers by upregulating vascular endothelial growth factor and downregulating necrosis factor B, according to Dumfarth *et al*., A higher frequency of wound healing issues demanding antibiotic therapy was reported in the control group (22% vs. 4% in the SWT group) [9].

Shehadi *et al*., [10] observed that dermal thickness increased by up to 40% in thinner skin and 27% in thicker skin in their investigation. Similarly, an increase in collagen-producing cells the rise in bundle thickness was 22%, whereas the increase in epidermal thickness was 9%. Dryburgh *et al*., [11] discovered that dermal thickness increased by up to 46% in thinner skin and 32% in thicker skin in their investigation. Similarly, an increase in collagen-producing cells growth in bundle thickness was 20%, while the increase in epidermal thickness was 6%. Davies *et al*., [12] reported that dermal thickness increased by up to 40% in thinner skin and 28% in thicker skin in their investigation of the therapy of necrotic ulcers. Similarly, the collagen-bundle thickness increased by 21%, while the epidermal thickness increased by 8%.

The mean length of hospital stay in the Madhuri V study was 18.33± 4. 7 days in the trial and12.22 ±4.8 days in the usual group. When compared to the standard debridement group, the pain during the treatment was observed to be greatly reduced [6]. The Visual Analogue Scale was used to assess pain (VAS). The mean VAS ratings in the Madhuri V study were 4.9 1.1±10 in the conventional group and 2.55 ±1.227 in the experimental group. Because the p0.05 level is statistically significant, Dermabrasion has the advantage of being less painful than the standard treatment. According to the Madhuri V *et al*., study, at the end of the final and fifth follow up in the Trial group, 22% had healing ulcers, 64% had totally healed ulcers, 11% were lost in follow up, and 3% were scheduled for definitive surgery [6]. Compared to standard debridement, the method caused less pain. Visual Analogue Scale measured pain (VAS).

In Hoysal D study, the conventional group's mean VAS score was 4.95± 1.079 and the trial's was 2.60± 1.047. Statistically, Dermabrasion is less uncomfortable than standard treatment (p0.05). In this study, the trial group's mean hospital stay was 13.33± 4.397 days and the conventional group's was 12.22± 4.837 days. Both groups' In-hospital stays are comparable [5]. In the present study Conventional group, 17% had healing ulcers, 56% had totally healed ulcers, 18% were lost in follow-up, and 9% were scheduled for definitive surgery. At the end of the fifth follow-up in the Trial group, 20% had healing ulcers, 65% had totally healed ulcers, 12% were lost in follow-up, and 3% were scheduled for definitive surgery. At the end

of the fifth follow-up in the Conventional group, 18% had healing ulcers, 53% had totally healed ulcers, 19% were lost in follow-up, and 10% were scheduled for definitive surgery. Dermabrasion give equivalent results to conventional debridement in the treatment of ulcers.

Conclusion

The results of this study indicate that the use of dermabrasion in the treatment of ulcers significantly reduces the amount of pain experienced during the procedure, increases the rate at which granulation occurs, and shortens the amount of time it takes for the wound to heal, all without causing any damage to the normal tissue or leading to any complications. Dermabrasion is a suitable option for ulcer management since it causes low discomfort and causes minimal harm to the healthy granulation tissue. When compared to traditional mechanical debridement, the results of dermabrasion and conventional mechanical debridement are comparable. To completely demonstrate the impacts on wound healing, however, a larger sample size is required to be taken into consideration. When it comes to the treatment of ulcers, dermabrasion produces outcomes that are on par with those produced by traditional mechanical debridement.

Acknowledgement

The author is thankful to the Department of General Surgery for providing all the facilities to carry out this work.

Conflict of interest: None.

Funding support: Nil.

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