

ORIGINAL RESEARCH

A comparative study of collagen granules vs conventional saline dressing in the management of chronic wound

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ABSTRACT

Background: A continual/chronic ulcer or wound doesn't heal in an orderly set of degrees and in a predictable quantity of time as most of wounds do; wounds that don't heal within 03 months are considered persistent. **Aim:** To establish the efficacy of collagen granules in healing these chronic wounds. **Methods:** In this prospective study, a total of 178 patients were divided into two groups, according to the type of dressing i.e., for group A patients collagen granules were used, and for group B patients normal saline dressings were used. The collagen granules used for this study were "Biofil". **Results:** There has been a significant decrease in the size and depth of the ulcers treated with collagen granules as compared to the normal saline-soaked dressing. **Conclusion:** The usage of collagen granules dressing has elevated the rate of wound recuperation in chronic ulcers; in this study, the authors have observed that the rate of wound restoration was notably higher in using collagen granules for chronic wound management. These materials are promising new technology in the field of wound healing and are cost-effective.

Keywords: Collagen Granules, Conventional Saline Dressing, Chronic Wound

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INTRODUCTION

Collagen is the most abundantly found protein in the human body. The functioning of mostly all systems and organs of the body is dependent on collagenous structures and about 70 percent of the dry weight of the skin is collagen. The use of collagen for wound healing has drawn recent interest from researchers in recent years and because of the involvement of various chemical and biological factors, no wholistic single research work on the role of collagen in wound healing has been completed. In almost every instance, conclusions were drawn from various references.

A continual/chronic ulcer or wound is the only one that doesn't heal in an orderly set of degrees and in a predictable quantity of time the manner most wounds do; wounds that don't heal within 03 months are regularly considered as persistent or chronic wounds.¹ Authors now know that wounds re-epithelise much faster or develop granulation tissue faster when treated with dressings that allow moist wound healing. Authors recognize that occluding wounds do not lead to infection. Even though many modalities of wound

care have come up to assist a surgeon e.g., the use of compression bandages to treat venous ulcers, the problem of chronic wounds management remains to ponder.^{2,3}

MATERIAL AND METHODS

The present prospective cohort study was conducted in the Department of Surgery of a military hospital of the Indian armed forces from November 2020 to September 2022. A total of 178 patients were included in this study. The study population comprised patients having chronic ulcers who reported to the hospital as per the following data:

INCLUSION CRITERIA

- Patients presenting with ulcers
- Age > 18 years

EXCLUSION CRITERIA

- Age < 18 years
- Patients not giving consent to the newer modality of dressing

- c. Untreated osteomyelitis
- d. Malignancy-related wound
 - a. e Enterocutaneous fistulae
- e. Patients with Tuberculosis/Leprosy

METHOD OF COLLECTION OF DATA

Patients were divided into two groups viz. Group A and Group B consisted of 89 patients each, where Group A was treated with collagen granules while Group B was treated with 0.9% normal saline dressings respectively. Proper written and informed consent was obtained from each patient before treatment. Wounds were measured using sterile transparent paper placed on the wound to mark the borders. The remaining paper was kept in the formalin

chamber for other dressing. The two largest perpendicular diameters were measured using a ruler (in millimeters) and multiplied for obtaining the total area of the wound. The depth was calculated with a vernier caliper (in millimeters). The wound was closed using occlusive dressing after irrigation with normal saline, surgical debridement, and application of collagen granules or 0.9% normal saline-soaked gauze and re-opened for examination on days 3,5,7,10 & 15.

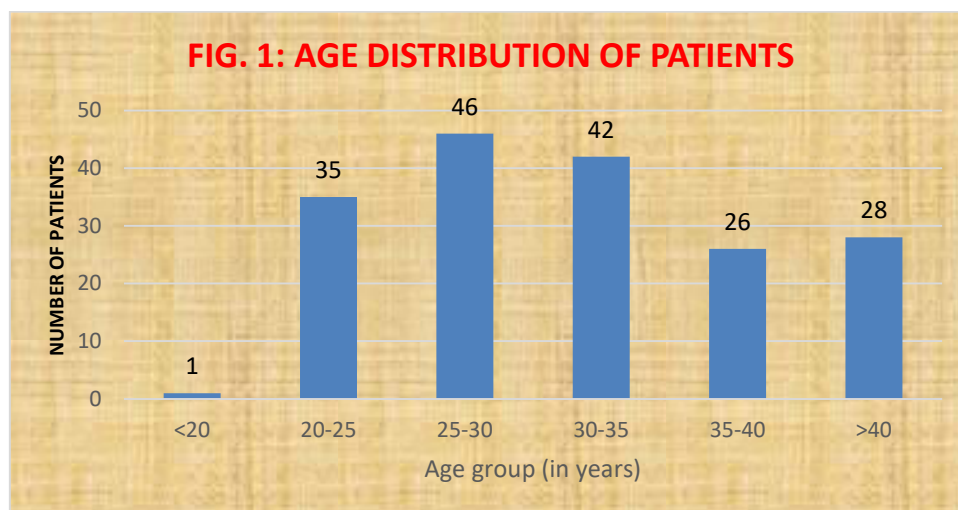
RESULTS

AGE DISTRIBUTION

Most of the patients presenting with wounds were between 25 and 30 (25.84%), followed by 30-35 (19.66%). (Table 1 and Fig 1.)

Table 1: Age distribution of patients

Age group (in years)	No. of Patients	Percentage
<20	1	0.56
20-25	35	19.66
25-30	46	25.84
30-35	42	23.6
35-40	26	14.61
>40	28	15.73

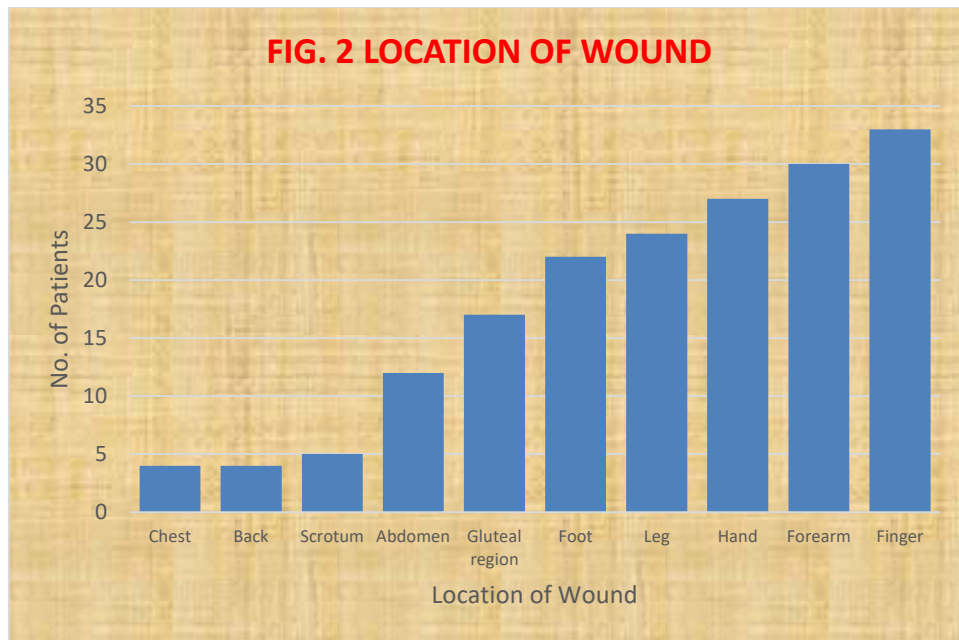


LOCATION OF THE WOUND

Wounds were mostly located on fingers and hands followed by forearm. (Table 2 and Fig 2.)

Table 2: Location of wound

Location of Wound	No. of Patients
Chest	4
Back	4
Scrotum	5
Abdomen	12
Gluteal region	17
Foot	22
Leg	24
Hand	27
Forearm	30
Finger	33

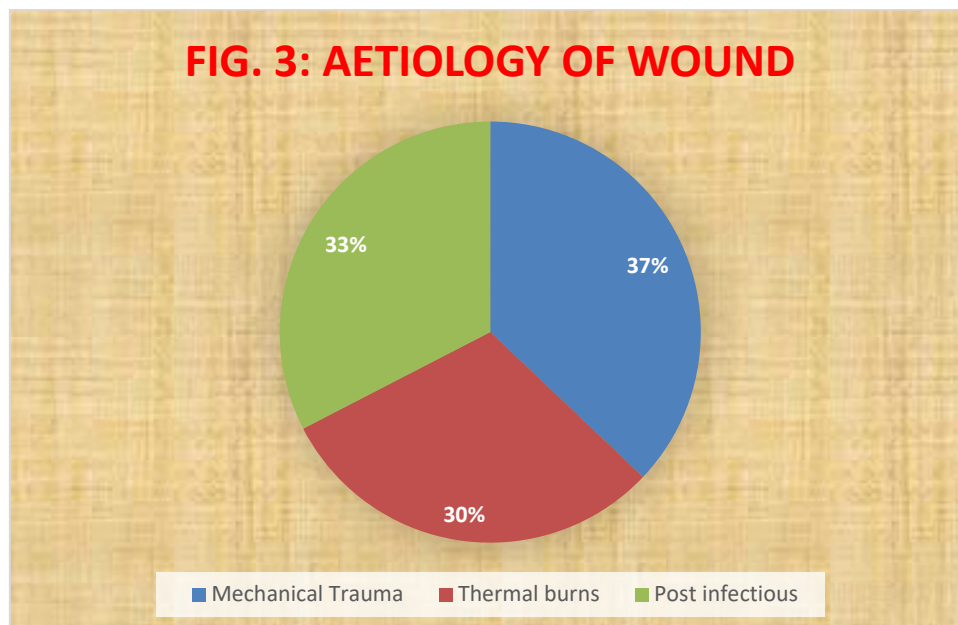


AETIOLOGY OF WOUND

Based on etiology determined by history and clinical examination, wounds were classified into different groups of which majorities were post-mechanical trauma (37%) followed by post-infectious origin (33%) and thermal burns (30%) respectively. (Table 3 and Fig 3.)

Table 3: Aetiology of wound

Etiology of Wounds	No. of Patients
Mechanical Trauma	66
Thermal burns	54
Post-infectious	58



OUTCOME OF THE STUDY (RESULTS)

In the present study, it was concluded that there is a significant decrease in the size as well as the depth of the wound after using collagen granules as a dressing material than with normal saline. (Table 4-7 and Fig 4-7)

Table 4: Comparison of wound size after collagen dressing

Days after collagen dressing	<20 sq cm	20-40 sq cm	>40 sq cm
Day 0	16	46	27
Day 3	22	42	25

Day 5	37	32	20
Day 7	59	18	12
Day 10	76	8	5
Day 15	84	4	1

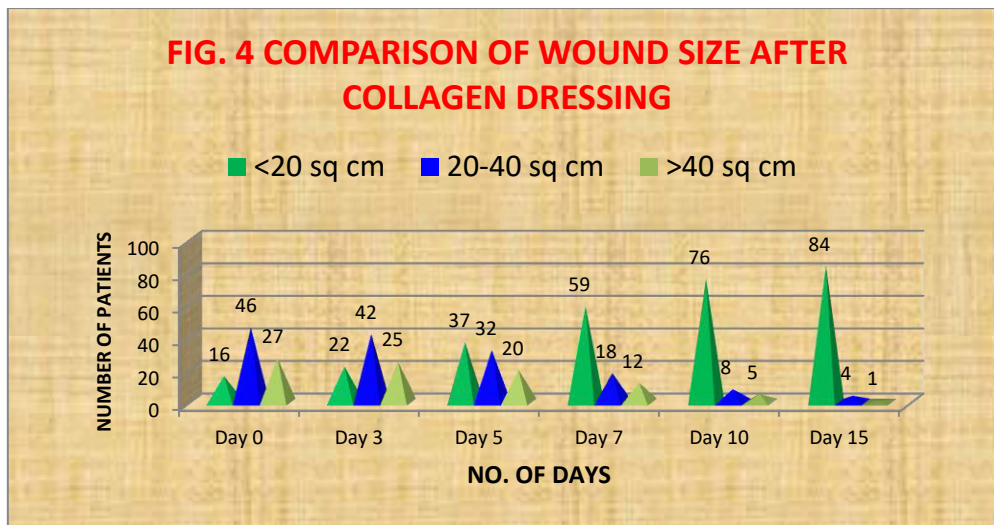


Table 5: Comparison of wound size after normal saline dressing

Days after Normal saline dressing	<20 sq cm	20-40 sq cm	>40 sq cm
Day 0	17	48	24
Day 3	20	47	22
Day 5	24	45	20
Day 7	28	49	12
Day 10	26	55	8
Day 15	27	54	6

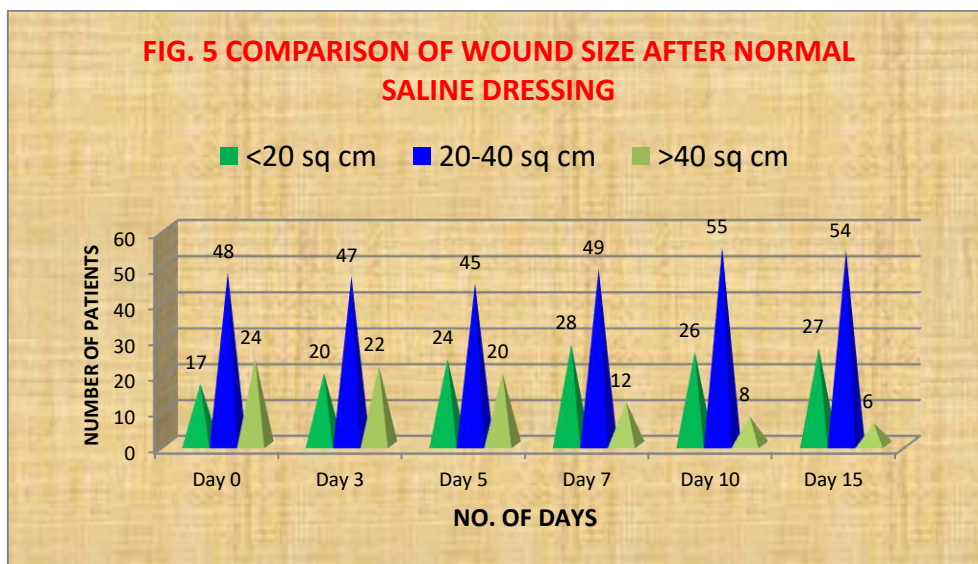


Table 6: Comparison of wound depth after collagen dressing

Days after collagen application	<2 mm	2-5 mm	>5mm
Day 0	14	52	23
Day 3	25	46	18
Day 5	43	34	12
Day 7	59	24	6
Day 10	73	12	4
Day 15	85	4	0

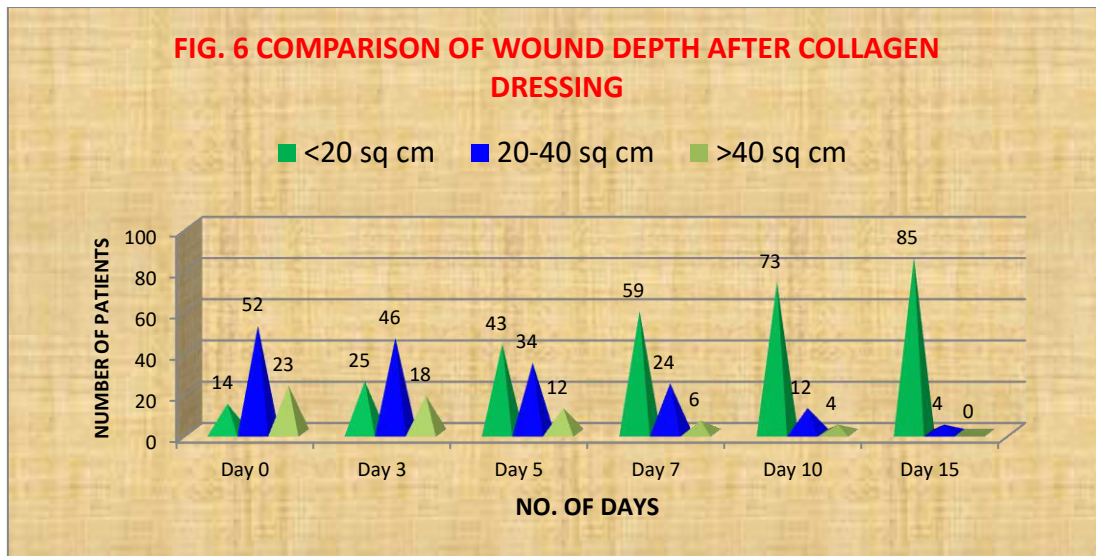
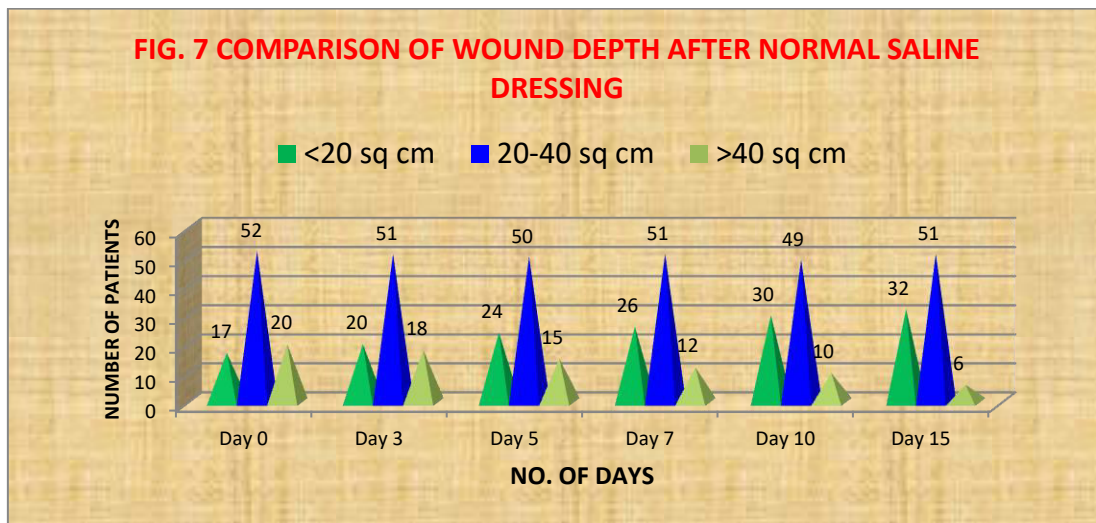


Table7: Comparison of wound depth after normal saline dressing

Days after Normal saline dressing	<2 mm	2-5 mm	>5mm
Day 0	17	52	20
Day 3	20	51	18
Day 5	24	50	15
Day 7	26	51	12
Day 10	30	49	10
Day 15	32	51	6



DISCUSSION

Wound/Ulcer size was compared between the test and the control group on day 0, day 3, day 5, day 7, day 10, and day 15. The results were analysed and inferred that the wounds healed better and were treated with collagen dressings. Various aetiologies that were considered in this study were post-traumatic ulcers, post-infectious ulcers, and post-thermal burns causing ulcers. In a similar study done by Singh et al, it was found that out of 60 patients of the collagen group, 42 (70%) wounds showed complete closure with collagen dressing in six weeks or lesser.⁴ This was comparable with this study, however, there was found to be a good healing rate within the first week of collagen dressing.

In another study done by Veves and Sheehan on 276 patients with diabetic foot ulcers divided equally into two groups of which one group was managed with collagen while another group was with other dressing materials.⁵ They found no significant difference in the completeness of healing of wounds when wounds of more than six months were compared. But the healing was better in wounds of less than six months duration treated with collagen dressings. Although in this study authors found that after 2 weeks, there was a significant improvement in ulcer size even in older ulcers. A Study by Bhattacharya et al showed excellent results by using Collagen sheets on patients with toxic epidermal necrolysis (TEN).⁶ Mason and

read demonstrated that microfibrillar collagen triggered the adhesiveness of platelets and stimulated the release phenomenon producing aggregation of nearby platelets.⁷ Piatkowski et al established that pressure ulcers treated with collagen dressings showed a superior response of healing by having a positive effect on angiogenesis and superior reduction of inflammation.⁸ Elgharably et al presented first evidence from a preclinical setting explaining how a collagen-based dressing may improve wound closure by targeting multiple key mechanisms.⁹ Martorell-Calatayud et al established that the use of porcine type I collagen dressings as an adjunct or definitive tool for the closure of surgical defects on the scalp measuring more than 5 cm in which periosteum has been removed proved to be simple, inexpensive, and effective.¹⁰ Mathangi et al used collagen-based dressings in superficial and partial thickness burns. 73% of all cases healed without any infection and complete epithelialization was seen within 6 weeks.¹¹ The collagen dressing has been observed to reduce the action of metalloproteinases on the healing of the wound.¹² Also, collagen provides a favourable healing environment by encouraging a scaffold upon which healing can occur.¹³

CONCLUSION

The use of collagen granules dressing accelerated the rate of wound healing in chronic ulcers. In this study, the authors found that the rate of wound healing was significantly better in using collagen granules. Thus, reducing the ulcer size can help patients to early return to work and reduction in financial burden on the institution or organization.

DECLARATION

FUNDING

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CONFLICT OF INTEREST

None declared

ETHICAL APPROVAL

Approved by Institutional Ethical Committee

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