Original Article

To Evaluate the Effect of Collagen Dressing in Diabetic Foot Ulcer Patients

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Abstract

Aim: To assess the outcome of collagen dressing in the treatment of diabetic foot ulcers.

Materials & methods: 100 patients who presented with diabetic foot ulcers were included as study group. Patients with diabetic foot ulcers who were known cases of carcinomas and connective tissue disorders were excluded from the present study. Pre-treatment dimensions were recorded. Collagen dressing was applied at regular follow-ups and subsequent examination of the lesion was done.

Results: Mean wound area before dressing as 41.3 mm2, while mean wound area second weak after dressing was 18.9 mm2. Significant results were obtained while comparing the mean wound area before dressing and second week after dressing.

Conclusion: Diabetic foot ulcers treated with collagen dressing are efficacious in terms of reduction in wound area resulting in early wound healing. Collagen-based wound dressings can be an effective tool in the healing of diabetic foot wounds.

Keywords: Collagen, Diabetic ulcer.

INTRODUCTION

Diabetes is fast gaining the status of a potential epidemic in India with more than 62 million diabetic individuals currently diagnosed with the disease. Diabetes complications are common among patients with type 1 or type 2 diabetes but, at the same time, are responsible for significant morbidity and mortality.1

In India, it is estimated that approximately 40,000 legs are being amputated every year, of which 75% are neuropathic with secondary infection, which is potentially preventable. Certain factors, such as, barefoot walking, illiteracy, low socioeconomic status, late presentation by patients, ignorance about diabetic foot care among primary care physicians, and belief in the alternative systems of medicine contribute to this high prevalence.2- 4

Diabetic neuropathy is the common factor in almost 90% of diabetic foot ulcers. Nerve damage in diabetes affects the motor, sensory, and autonomic fibers. Motor neuropathy causes muscle weakness, atrophy, and paresis. Sensory neuropathy leads to loss of the protective sensation of pain, pressure, and heat.4

Structural foot deformities and abnormalities, such as flatfoot, hallux valgus, claw toes, Charcot neuroarthropathy, and hammer foot, play an important role in the pathway of diabetic foot ulcers since they contribute to abnormal plantar pressures and therefore predispose to ulceration.5, 6

Collagen is the major protein of the extracellular matrix and is the most abundant protein found in mammals comprising 70%–80% of the skin (dry weight) and 25% of the entire protein. Collagen acts as a structural gallow in the tissues. Hence, collagen plays a central role at each stage of wound healing.7- 9 Hence; under the light of above-mentioned data, we planned the present study to assess the outcome of collagen dressing in the treatment of diabetic foot ulcers.

Materials & methods

The present study was conducted with the aim of evaluating the outcome of collagen dressing in the treatment of diabetic foot ulcers.Ethical approval was obtained from institutional ethical committee and written consent was obtained from all the patients after explaining in detail the entire research protocol. 100 patients who presented with diabetic foot ulcers were included as study group. Patients with diabetic foot ulcers who were known cases of carcinomas and connective tissue disorders were excluded from the present study. The patients with diabetic foot ulcer with untreated underlying osteomyelitis or with unstable fractures or lose fragments of bone were also excluded. Evaluation of diabetic foot lesion was done. Pre-treatment dimensions were recorded. Collagen dressing was applied at regular follow-ups and subsequent examination of the lesion was done. All the results were recorded and analysed using SPSS software.

Results

31 percent of the patients (31 patients) belonged to the age group of more than 60 years. 23 percent of the patients (23 patients) and 26 percent of the patients (26 patients) belonged to the age group of 51 to 60 years and 41 to 50 years respectively. Mean age of the patients was 54.5 years. Out of total of 100 patients with diabetic foot ulcers, 76 percent of the patients (76 patients) were males while the remaining 24 percent of the patients (24 patients) were females. 25 percent of the patients (25 patients) had duration of diabetes between 11 to 15 years. 45 percent of the patients (45 patients) had duration of diabetes between 5 to 10 years.In 40 percent of the patients, diabetic foot ulcer was of less than 10 days duration. In 15 percent of the patients, and 20 percent of the patients (20 patients), diabetic foot ulcer was of 11 to 20 days and 21 to 30 days duration respectively. Mean wound area before dressing as 41.3 mm2, while mean wound area second weak after dressing was 18.9 mm2. Significant results were obtained while comparing the mean wound area before dressing and second week after dressing.

Table 1: Age -wise distribution of patients

Age group (years)	Number of patients	Percentage of patients
Less than 30	8	8
30 to 40	12	12
41 to 50	26	26
51 to 60	23	23
More than 60	31	31
Total	100	100
Mean age $\pm$ SD	54.5$\pm$ 13.2	

Table 2: Distribution of patients according to duration of diabetes

Duration of diabetes	Number of patients	Percentage of patients
Less than 5 years	15	15
5 to 10 years	45	45
11 to 15 years	25	25
16 to 20 years	10	10
More than 20 years	5	5
Total	100	100

Table 3: Comparison of wound area at different time interval

Parameter	Before dressing	Second week after dressing	p- value
Mean wound area before dressing (mm^2)	41.3	18.9	0.001 (Significant)
$\pm$SD	4.2	2.8	

Discussion

Diabetic foot ulcer is an outcome of complicated amalgam of various risk factors such as peripheral neuropathy, peripheral vascular disease, foot deformities, arterial insufficiency, trauma and impaired resistance to infection.Neuropathy is a disease affecting nerves causing impairment in sensations, movement and other aspects of health depending upon the nerve affected. Peripheral neuropathy in diabetes is one of the major causes of foot ulcers. Up to 66% of patients with diabetes face peripheral neuropathy in the lower extremity. Studies reported that metabolic abnormalities due to hyperglycemia cause neuropathy.10Hence; under the light of above-mentioned data, we planned the present study to assess the outcome of collagen dressing in the treatment of diabetic foot ulcers.

In the present study, 31 percent of the patients (31 patients) belonged to the age group of more than 60 years. 23 percent of the patients (23 patients) and 26 percent of the patients (26 patients) belonged to the age group of 51 to 60 years and 41 to 50 years respectively. Mean age of the patients was 54.5 years. Out of total of 100 patients with diabetic foot ulcers, 76 percent of the patients (76 patients) were males while the remaining 24 percent of the patients (24 patients) were females. 25 percent of the patients (25 patients) had duration of diabetes between 11 to 15 years. 45 percent of the patients (45 patients) had duration of diabetes between 5 to 10 years. In 40 percent of the patients, diabetic foot ulcer was of less than 10 days duration. In 15 percent of the patients, and 20 percent of the patients (20 patients), diabetic foot ulcer was of 11 to 20 days and 21 to 30 days duration respectively. Park YJ et al examined the effectiveness and safety of a new collagen dressing material in the treatment of DFU. The study group presented a higher rate of complete healing as compared to that in the control group. At the last follow-up, ulcer sizes of the study group were smaller than those of the control group.13Chadwick P et al evaluated the performance and safety of Exufiber, a gelling fibre wound dressing incorporating Hydrolock technology, in the management of highly exuding diabetic foot ulcers (DFUs). Their study demonstrated the capacity for the test dressing to minimise damage to the peri-wound skin and dressing-associated pain. Despite the majority of wounds remaining unhealed at the final visit, improvements were noted in terms of tissue type and a significant reduction in wound area and volume.14

In the present study, mean wound area before dressing as 41.3 mm2, while mean wound area second weak after dressing was 18.9 mm2. Significant results were obtained while comparing the mean wound area before dressing and second week after dressing. In another study conducted by Sivakumar et al, authors compared the efficacy and safety of collagen granule dressings and conventional dressing in diabetic wounds in terms of reduced healing time, number of dressing, healing quality and complications. There was statistically significant difference between the results of collagen and saline dressings as collagen dressings had better healing response rate as compared to placebo when given along with standard treatment of diabetic foot ulcer.15Sethy MK et al compared the efficacy of collagen-based dressing against conventional dressing in diabetic foot ulcer treatment especially in Indian scenario. Collagen-treated patients enjoyed early and more subjective mobility. Significant better results in terms of completeness of healing of Diabetic foot ulcer is found in collagen dressing. They concluded that collagen dressing may avoid the need of skin grafting, and provides additional advantage of patients' compliance and comfort.16

Conclusion

Diabetic foot ulcers treated with collagen dressing are efficacious in terms of reduction in wound area resulting in early wound healing. Collagen-based wound dressings can be an effective tool in the healing of diabetic foot wounds.

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