Evaluation of Therapeutic Outcomes of Reconstruction of Pressure Ulcer Injuries by Flap Coatings in Patients Admitted to Taleghani Hospital in Kermanshah during 2015-2016

Objective: *Pressure ulcers, following cancer and heart disease, are considered as the third most costly health problem. In addition to high cost of treatments, considerable time is spent on care for patients. This study tends to evaluate the therapeutic outcomes of reconstruction of pressure ulcer injuries by flap coatings.*

Methods: *This study is prospective; 85 patients with pressure ulcer who referred to Taleghani Hospital in Kermanshah during 2015-2016 for treatment by muscular coating flaps were followed up 1 week and 3 months after discharge. Reconstruction was done again if the treatment was unsuccessful. Data was analyzed by SPSS software version 22.*

Results: *The success rate of pressure ulcer reconstruction by coating flaps significantly increased after 1 week and 3 months ($P<0.05$, 50.6% and 90.5%, respectively). The success rate of pressure ulcer reconstruction by coating flaps significantly increased after 1 week and 3 months in terms of age, gender, and BMI ($P<0.05$).*

Conclusion: *The success of pressure ulcer reconstruction increased by coating flaps after 3 months.*

Keywords: pressure ulcer, coating flap, reconstruction.

Introduction

Pressure ulcer is caused by local damage due to pressure and ischemic injuries in the soft tissue, muscle, cartilage and bone (1). Pressure ulcer is often found on bone eminences as red areas without skin changes or as areas with loss of epidermis and derma and may extend to subcutaneous tissues and muscles and bone (2). Pressure ulcer is a major health problem which usually occurs in patients who require long-term care. American scientists (2003, 2013) estimate that 1.3-3 million adults are affected by pressure ulcers (3). The risk factors of pressure ulcers include inactivity, low BMI, some medicines and medical equipment, age, moisture, malnutrition, peripheral circulation disorder, fever, and obesity (4). Pressure ulcer is associated with complications such as pain, infection, increased hospitalization time, increased hospital costs, increased mortality and reduced quality of life (5). Currently, billions of dollars are spent in care centers worldwide for prevention and treatment of pressure ulcers, particularly for patients with long-term hospital stay (6). Pressure ulcer have been identified as one of the most costly health disorders in the 21st century (7). In various studies, the prevalence of pressure ulcers has been reported at 3.5-69% (8). If pressure ulcers are not treated, they lead to lethal and

dangerous complications, including osteomyelitis and death (9). Although pressure ulcers are said to be preventable, this does not seem to be easy in practice, and these ulcers are seen in the best centers in the United States (10). Patients, families, healthcare providers, and the community are significantly affected by physical, financial and social consequences of pressure ulcers and patients with pressure ulcers inevitably experience pain, malformation, disability and dependence on others (11). Large defects caused by pressure ulcers are usually repaired by plastic surgeons. Among ulcer reconstruction methods, skin graft such as flap is considered as the most suitable method aesthetically and functionally (12). Surgery for treatment of pressure ulcer is based on three principles: 1) radical debridement of all necrotic tissue; 2) osteotomy of the affected bones under the ulcer; 3) application of different flaps to cover the ulcer area (13). Little is known about application of flap coatings to repair pressure ulcer. Due to failure to reconstruct the postoperative pressure ulcer, this study tends to investigate the therapeutic outcomes of pressure ulcer reconstruction by flap coatings in Kermanshah during 2015-2016 and determine its role in preserving the organs as well as incidence of complications related to these treatments.

Materials and Methods

The present study is a descriptive-analytical (prospective) study approval by the ethics committee of Kermanshah University of Medical Sciences. The studied population included patients with pressure ulcers; after describing the project, the participants completed the informed consent form. The patients who had a history of human immunodeficiency and diabetes were excluded. The sample size was calculated at 85 based on Yang's study and treatment success rate. Therefore, total number of samples was 85 (14). The sample size formula is as follows:

$$n = \frac{Z^2_{1-\alpha/2}(p(1-p))}{d^2} = \frac{(1.96)^2\big((0.76)(0.24)\big)}{(0.09)^2} \simeq 85$$

Considering the 95% confidence level and the 9% accuracy, treatment success rate was 76%, with a minimum sample size of 85 in each group. The sample size formula is as follows.

A questionnaire based on main objectives of the project including demographic information, treatment complications, treatment outcome, reconstruction, number of flaps to assess the success of flap coating in patients was completed for each patient. Patients were first examined by a collaborator assistant to examine exclusion criteria. Subsequently, the coating flaps were

examined in terms of efficiency and preserving the related member function and complications and failure of the treatment. The results were presented after final examination. Then, the patient's condition was followed up to 1 week and 3 months later; they underwent reconstruction in the event of a failure (the reconstruction site did not get close to normal state). Data was transferred to SSPS software version 22. For data analysis, descriptive statistics (mean, tables, one-dimensional and two-dimensional graphs, standard deviation and variance) were used. Quantitative data analysis was based on KS test. Then, independent t-test or Mann-Whitney test were used. For qualitative data, Chi-square test or Fisher's exact test were used ($p<0.05$).

Results

In this study, 85 eligible patients with pressure ulcer who referred to Taleghani Hospital in Kermanshah during 2015-2016 were examined. Patients aged 28-43 years (33.61 ± 3.96); 63% of the participants were male; 57% of participants had BMI<25; 61.2% had Ischial ulcer, 23.5% had Sacral ulcer, 11.8% had Trochanter ulcer, 3.5% had heel ulcer, 61.2% had upper glothea pedicule flap and 5.9% had complications. Table 1 presents the results.

Table 1: frequency and percentage frequency of demographic variables

Demographic variables	N (%)
Age	
≤30	**26 (14.8)**
30-35	**35 (14.8)**
35-40	**20 (22.2)**
>40	**4 (4.7)**
Gender	
Female	**31 (36.5)**
Male	**54 (63.5)**
Flap type	
Upper glothea pedicule	**52 (61.2)**
V-Y	**2 (23.5)**
Lacteral thigh	**10 (11.8)**
Advanced	**3 (3.5)**
BMI	
<25	**36 (42.5)**
>25	**49 (57.5)**
Type of pressure ulcer	
Ischial	**52 (61.2)**
Sacral	**2 (23.5)**
Trochanter	**10 (11.8)**
Heel	**3 (3.5)**
Type of Complications	
Partial necrosis	**4 (4.7)**
Complete necrosis	**2 (2.4)**
Seroma	**2 (2.4)**

No Complications	**77 (90.5)**

Wilcoxon test was used to compare the success rate of pressure ulcer reconstruction by coating flaps after 3 months in terms of demographic variables. According to Table 2, there was a significant difference in success rate of pressure ulcer reconstruction by coating flaps between patients younger than 33 years and older than 33 years, between male and female patients, between patients with BMI<25 and BMI>25 after one week and 3 months (P<0.05) Thus, success rate of pressure ulcer reconstruction increased by coating flaps in patients after 3 months.

Table 2: frequency and comparison of success rate of pressure ulcer reconstruction by coating flaps in terms of variables

Variable	Section (month)	Outcome		Test statistic	P-value
		Failure	Success		
<33	3	11 (9.28)	27 (1.71)	2.52	0.012
>33	3	6 (8.12)	41 (87.2)	3.3	0.001
Female	3	3 (9.7)	28 (90.3)	3.05	0.002
Male	3	14 (25.9)	40 (74.1)	2.85	0.004
BMI<25	3	3 (7.7)	36 (92.3)	3.87	>0.001
BMI≥25	3	14 (30.4)	32 (69.6)	2.13	0.033

Based on the results, there was a significant difference in success rate of pressure ulcer reconstruction by coating flaps after one week and three months (P<0.05). Thus, success rate of pressure ulcer reconstruction increased by coating flaps after 3 months (Figure 1).

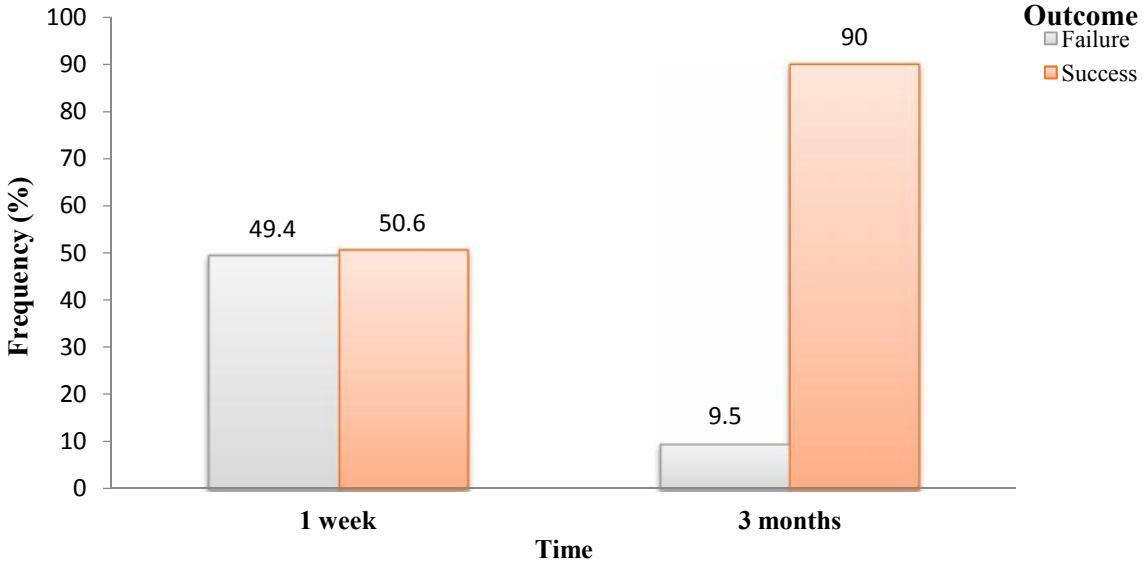

Figure 1: frequency of success rate of pressure ulcer reconstruction by coating ulcers after three months

Discussion and Conclusion

There are interventions for management of pressure ulcers. These interventions include a wide range of palliative measures to treatments involving reconstructive surgical procedures. Surgery typically involves ulcer debridement, along with replacement of damaged tissue with a new tissue at the site of the ulcer. While reconstructive surgery is an acceptable method in ulcer management (15). In this study, success rate of pressure ulcer reconstruction was increased by coating flaps after 3 months. Moreover, pressure ulcer reconstruction by coating flap was successful after 3 months in terms of age, gender, and BMI. Therefore, these variables did not have a negative effect on this success.

According to the results, the highest incidence of pressure ulcer was in men in the Ischial area, which is consistent with Alizadeh et al. (16). Perhaps the reason for this is the differences in muscle and skeletal structure of men and higher fat accumulation in women's buttocks.

The most common incidence of ulcer was in the age range of 30 to 35 years old. The results of this study were consistent with Dr. Baqaee et al. who found that the incidence of ulcer increased with age (17).

Consistent with the current study, Marchi et al. reported the prevalence of Ischial ulcer (62.3%), Sacral (41.7%), and trochanteric (18.4%). The most commonly used flaps were gluteus flap (62%) followed by V-Y flap (29%). Lin et al. (2014) concluded that no cases of death or recurrence of pressure ulcer due to flap surgery have been reported. The benefits of flap surgery include a shorter duration of surgery, less bleeding and less trauma, making the flaps an ideal choice for covering sacral ulcers (19).

A strength of this study was that it was semi-experimental. In addition, all patients were surgically operated by an experienced surgeon and the same procedure. However, this study had limitations: First, due to the limited number of similar studies, the current study cannot be compared with other studies. Therefore, it is suggested that further studies be developed in the future. Second, this study did not have control group. Therefore, it is recommended to consider this in future studies.

Based on objective observations, coating flaps lead to successful reconstruction of pressure ulcers after three months of treatment. Moreover, age, gender, and BMI of patients cannot affect the improvement process. Based on the results, success rate of pressure ulcer reconstruction increased by coating flaps after three months.

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