Journal of Cardiovascular Disease Research
ISSN: 0975-3583, 0976-2833 || VOL 16, ISSUE 01, 2025

OUTCOME OF SMALL WOUND HEALING BY SECONDARY INTENTION

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ABSTRACT

Introduction: Wound healing is a complex physiological process involving multiple stages, including inflammation, proliferation, and remodeling. Healing by secondary intention occurs when a wound is left to heal naturally without primary closure. This process is commonly used for small wounds, particularly those that are superficial, infected, or involve tissue loss. It involves extensive granulation tissue formation, wound contraction, and re-epithelialization.
Objective: This study aimed to evaluate the outcomes of small wound healing by secondary intention in patients at the Emergency Department of Surgery at Sai Tirupati University, Udaipur, India.
Methods: A prospective analytical study was conducted involving 59 patients with small wounds (≤5 cm). Patients underwent standardized wound care, including daily dressing with polymyxin B-bacitracin ointment and semi-occlusive bandages. Specific care was tailored for wounds in high-risk areas to optimize healing.
Results: The mean age of participants was 31.13 years, with 50.85% females. Heel wounds were most common (25.42%). Infection occurred in 16.95% of cases. Scar formation was predominantly linear (74.58%), and 67.80% of patients had normotrophic scars after 3 months. Healing time was influenced by wound size, with larger wounds taking longer to heal ($p<0.0001$). Alcohol consumption and smoking did not significantly affect healing duration ($p=0.733$, $p=0.854$, respectively).
Conclusion: Secondary intention healing for small wounds yielded satisfactory outcomes. Wound size was a significant factor in determining healing duration, while scar type influenced recovery time. Proper wound management and individualized care are crucial for optimizing outcomes in secondary intention healing.

Keywords: secondary intention healing, wound management, granulation tissue, scar formation, wound infection, healing time.

INTRODUCTION

The response of tissues to injury is a fundamental aspect of surgical practice, with tissue injury and its sequelae playing a critical role in numerous general medical conditions.[1] Wound healing is a complex physiological process involving an intricate interplay of various cell types, cytokines, mediators, and vascular systems.[2] Initially, vasoconstriction and platelet aggregation occur to halt bleeding, followed by the infiltration of inflammatory cells like neutrophils. These cells release mediators and cytokines that promote angiogenesis, thrombosis, and re-epithelialization. Subsequently, fibroblasts lay down extracellular components that act as a scaffold for tissue repair.[2]

A wound, defined as a disruption of normal anatomical structures and function, remains a persistent clinical challenge due to early and late complications leading to morbidity and mortality.[3] Healing can occur by primary or secondary intention, with the latter being particularly valuable for specific types of wounds.

Healing by Secondary Intention

Secondary intention healing, though historically significant, has become less common with advancements in surgical techniques.[4] This approach is typically reserved for superficial surgical wounds, wounds created by destructive measures, or those that have dehisced, become infected, or resulted from necrosis of flaps or grafts. Unlike primary healing, secondary intention involves a more intense inflammatory reaction, larger granulation tissue formation, and significant wound contraction.[4]

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Secondary intention healing offers notable advantages. It is a simple process requiring only basic bandaging and daily care, which can often be managed at home. Properly treated wounds are usually painless, with minimal bleeding or infection.[4] This method eliminates the need for hospitalization and associated complications like hematomas, seromas, and graft loss, which are common with reconstructive procedures.

Cosmetic outcomes vary based on anatomical location. Wounds in concave surfaces like the nose, eyes, and ears (NEET areas) often heal imperceptibly, whereas convex surfaces (NOCH areas) may result in scars of varying acceptance. In specific high-risk locations, secondary intention healing enables monitoring for carcinoma recurrence, preventing residual tumor from being obscured by immediate repair.[5]

Overall, secondary intention healing provides a viable and often underestimated alternative for wound management with significant clinical and cosmetic benefits.

MATERIAL AND METHODS

This prospective analytical study was conducted in the Emergency Department of Surgery at Sai Tirupati University, Udaipur, Rajasthan, India. A total of 59 patients were included in the study, calculated using the formula:

$N= \quad Z^2 Pq/d^2$

Inclusion Criteria:

1) All patients having small wound on any part of the body.
2) Wound size less than 5 cm.

Exclusion Criteria:

1) Wound size more than 5 cm.
2) Patients having any medical conditions which can delay healing like cancer.
3) Patient not giving consent

Ethical Considerations:

The study was approved by intuitional human ethics committee. Informed written consent was obtained from all study participants. Confidentiality of the study participants were maintained throughout the study.

Procedure of Wound Management:

Patients meeting the inclusion criteria underwent detailed history-taking and standardized wound care. After wound creation, dressings were removed after 24 hours, and wounds were compressed with 3% hydrogen peroxide for 20 minutes to soften crusts. Polymyxin B-bacitracin ointment (Polysporin) was applied before covering with a semi-occlusive bandage, repeated daily until healing. In hair-bearing areas, hair was shaved or plucked to prevent excessive granulation from foreign body inflammation.

For small exposed cartilage or bone, frequent application of Polysporin created an occlusive environment to promote granulation and prevent desiccation. Concave cartilage areas could be excised to expose perichondrium, enhancing granulation tissue formation, while convex surfaces required structural preservation with small cartilage disks removed via dermal punch to support healing. For large exposed bone areas (1–10 cm), a thin portion of the outer cortex was removed with a bone chisel to reveal bleeding vessels, stimulating granulation tissue and normal healing.

RESULT AND OBSERVATION

The majority of patients in our study, 18 (30.51%), belonged to the age group of 31–40 years, while the least number of patients, 2 (3.39%), were in the ≤10-year age group. The mean age of the study population was 31.13 years. Among the participants, 30 (50.85%) were female, and 29 (49.15%) were male. Regarding wound infections, 10 patients (16.95%) experienced infections, whereas 49 patients (83.05%) did not.

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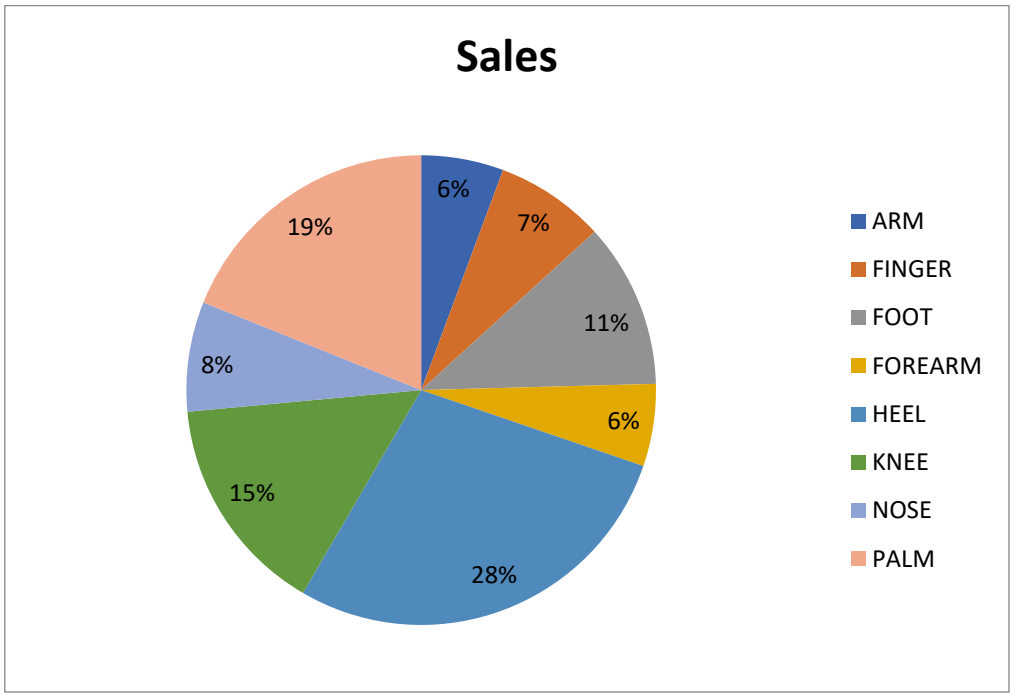

Figure 1: Distribution of site of wound

In our study, the majority of patients, 15 (25.42%), had wounds located on the heel, while the least number of patients, 3 (5.08%) each, had wounds on the arm, thigh, and toe.

Table1: Distribution of Patients according to Food Habits, Alcohal and Smoking.

Parameter	No. of patients	Percentage
Non vegetarian	24	40.68
Alcoholic	24	40.68
Smoker	27	45.76

In our study, 35 (59.32%) patients were vegetarians, while 24 (40.68%) were non-vegetarians. Additionally, 24 (40.68%) patients reported being alcoholic, whereas 35 (59.32%) were non-alcoholic. Furthermore, 27 (45.76%) patients were smokers, and 32 (54.24%) were non-smokers.

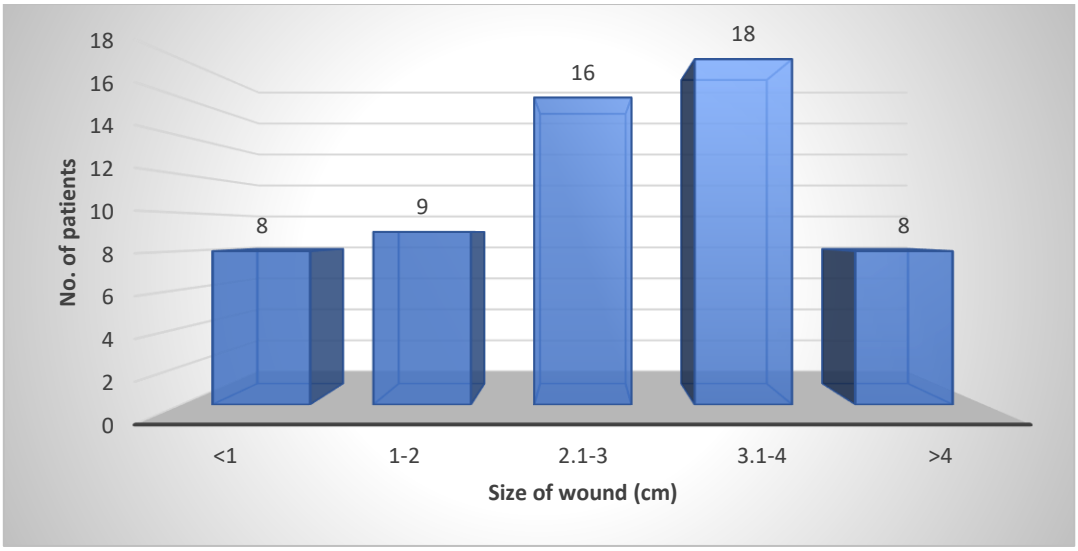

Figure 2: Distribution of size of wound

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In our study, the wound size was most commonly between 3.1–4 cm, observed in 18 patients (30.51%), while the least number of wounds, 8 (13.56%), were either <1 cm or >4 cm. The mean wound size was 2.62 cm.

Table 2: Distribution of perception of patient

Perception of patient	No. of patients	Percentage
Not satisfactory	2	3.39
Marginal	12	20.34
Satisfactory	33	55.93
Excellent	12	20.34
Total	59	100.00

In our study, 33 (55.93%) patients reported being satisfied, followed by 12 (20.34%) patients who were marginally or excellently satisfied, and only 2 (3.39%) patients were not satisfied. The majority, 44 (74.58%), had linear scars, while 15 (25.42%) had broad scars. Among the 59 patients, the majority, 40 (67.80%), showed improvement in scars classified as normotrophic after 3 months, followed by 10 (16.95%) with depressed scars, and 9 (15.25%) with hypertrophic scars showing improvement. Additionally, 35 (59.32%) patients had dark-colored scars, while 24 (40.68%) had light-colored scars.

Table 3: Correlation of Alcoholic and smoker with duration of healing

Parameter	Duration of healing (wks)		P value
	Mean	SD	
Alcoholic	4.7	1.82	0.733
Smoker	4.59	1.92	0.854

In our study, the average duration of healing for patients who consumed alcohol was 4.7 weeks, while for those who did not consume alcohol, it was 4.65 weeks. There was no statistically significant difference between alcohol consumption and duration of healing, with a p-value of 0.733. Similarly, the average duration of healing for smokers was 4.75 weeks, compared to 4.59 weeks for non-smokers. This difference was also not statistically significant, with a p-value of 0.854.However, the average duration of healing for patients with wide scars was 7.06 weeks, whereas for those with linear scars, it was 3.86 weeks. This difference was statistically significant, with a p-value of <0.0001.

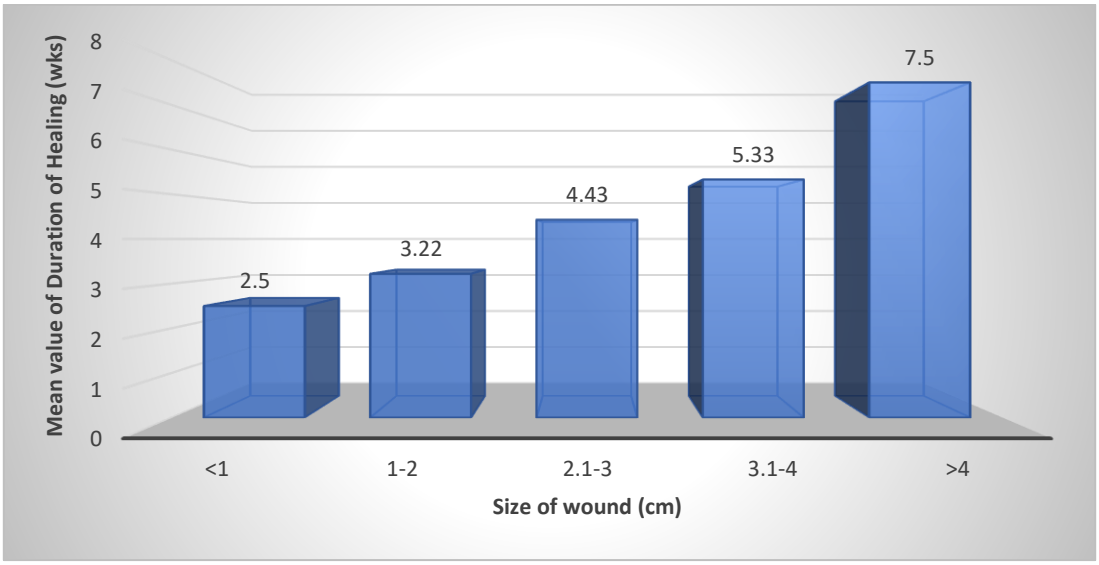

Figure 3: Correlation of size of wound with duration of healing

In our study, the average weekly duration of healing was longer in patients with larger wound sizes. There was a statistically significant association between wound size and duration of healing, with a p-value of <0.0001.

DISCUSSION

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This prospective study included 59 consecutive patients with small wounds healing by secondary intention, who presented to the outpatient department of General Surgery at the Pacific Institute of Medical Sciences, affiliated with Sai Tirupati University, Udaipur.

In summary, wounds located on concave surfaces tend to heal with superior cosmetic outcomes, while those on convex surfaces often exhibit less predictable results. Although a comprehensive comparison of secondary intention healing versus surgical repair falls outside the scope of this report, wounds in NEET areas healing by secondary intention frequently achieve better cosmetic outcomes than those managed with flaps or grafts. Conversely, deep wounds in NOCH areas typically achieve the best cosmetic results through precise primary surgical closure, provided it does not result in anatomical distortion.

It is essential to acknowledge that cosmetic outcomes are highly subjective, heavily influenced by patient expectations. Patients less concerned with cosmetic appearance may still be satisfied with the healing process, even in NOCH areas. Additionally, the appearance of healed wounds often continues to improve over 6 months to a year, as redness fades, scars soften, and mild wound contractions may resolve, allowing structures such as the lip, nasal ala, eyelid, or brow to return to their normal positions over time.

Certain wounds are better managed with surgical repair rather than secondary intention to avoid complications or prolonged healing. For instance, cheek or lip perforations may result in permanent fistulas and functional impairment, while upper eyelid wounds could expose the cornea. Similarly, extensive or deep wounds in the perioral and periorbital regions, which risk healing with eclabium or ectropion, require surgical intervention. Large wounds exceeding 10 cm on the forehead or scalp often face delayed healing and unstable scarring, making them more suitable for coverage with split-thickness skin grafts.

CONCLUSION

Wound healing is a complex clinical challenge that demands accurate and efficient management. Effective wound care involves the coordination of multiple cell populations, the extracellular matrix, and soluble mediators like growth factors and cytokines. Proper clinical interventions can significantly enhance the healing process and minimize the risk of complications.

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