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Comparative Study Between Conservative Dressings and Dressings with Papain-Urea & Silver Colloid in the Treatment of Skin Ulcers

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Abstract: ***Background: Skin ulcers-both chronic and acute—pose significant clinical challenges due to delayed healing, high infection risk, and complications such as tissue necrosis. While conservative dressings (e.g., gauze, hydrocolloid, or foam dressings) are widely used, they may not always provide optimal conditions for debridement and bacterial control. In contrast, modern dressings incorporating papain-urea (an enzymatic debriding agent) and silver colloid (with broad antimicrobial activity) are designed to accelerate wound healing. Objective: This study compares the efficacy of conservative dressings versus papain-urea and silver colloid dressings in treating skin ulcers. The primary outcomes evaluated include: 1) Wound healing rate (% reduction in wound size) 2) Infection control 3) Pain levels during dressing changes 4) Overall patient satisfaction. Methods: A prospective, randomized controlled trial was conducted in a tertiary care hospital over six months. Patients with chronic or non-healing skin ulcers were randomized into two groups: one receiving conservative dressings and the other receiving papain-urea and silver colloid dressings. Wound assessments, including measurements of wound area (using standardized digital photography), clinical infection signs, Visual Analog Scale (VAS) for pain, and patient satisfaction surveys, were conducted at baseline, Week 2, and Week 4. Data were analyzed using independent t-tests for continuous variables and chi-square tests for categorical variables (P < 0.05 considered statistically significant). Results: a) Healing Rate: The papain-urea & silver colloid group showed a 50% reduction in wound size at 4 weeks versus 25% in the conservative dressing group (P < 0.01). b) Infection Rate: Only 5% of patients in the papain-urea & silver colloid group developed infections compared to 35% in the conservative group (P < 0.05). c) Pain Levels: Average VAS scores were 2 (mild pain) in the papain-urea & silver colloid group versus 6 (moderate pain) in the conservative group (P < 0.01). d) Patient Satisfaction: Ninety percent of patients in the papain-urea & silver colloid group reported high satisfaction compared to 60% in the conservative group (P < 0.05). Conclusion: Papain-urea and silver colloid dressings significantly outperform conservative dressings in terms of wound healing, infection control, and patient comfort. These modern dressings should be considered for the treatment of chronic, non-healing ulcers, and further research into their long-term benefits is warranted.***

Keywords: Skin ulcers, wound healing, papain-urea, silver colloid, infection control, conservative dressings, pain management

1. Introduction

1.1 Background

Skin ulcers, including diabetic foot ulcers, venous leg ulcers, pressure ulcers, and ulcers related to arterial disease, remain a critical concern in both medical and surgical care. Conventional treatment primarily focuses on wound protection, moisture retention, and infection prevention. Although conservative dressings (gauze, hydrocolloid, or foam) are standard, their limited ability to effectively debride necrotic tissue and control microbial colonization can delay healing and increase the risk of secondary infections.

In contrast, papain-urea dressings facilitate enzymatic debridement, helping remove necrotic tissue, while silver colloid dressings provide robust antimicrobial action against a range of pathogens, including bacteria, fungi, and biofilms. This dual mechanism may create an optimal environment for wound repair and regeneration.

1.2 Study Rationale and Hypothesis

Given the limitations of traditional conservative dressings, this study evaluates whether dressings combining papain-urea and silver colloid yield superior clinical outcomes. We hypothesize that these modern dressings will lead to:

- Faster wound healing
- Lower infection rates
- Reduced pain during dressing changes
- Higher overall patient satisfaction

2. Materials and Methods

2.1 Study Design

- **Type:** Prospective, randomized controlled trial
- **Duration:** Six months
- **Setting:** Tertiary care hospital

2.2 Patient Selection Criteria

Inclusion Criteria:

- Age between 18 and 80 years
- Presence of a chronic or non-healing skin ulcer persisting for >4 weeks (e.g., diabetic foot ulcer, venous ulcer, pressure ulcer)
- Ability to provide informed consent

Exclusion Criteria:

- Systemic infections or sepsis

- Immunocompromised status (e.g., undergoing chemotherapy, HIV-positive)
- Known allergy to papain, urea, or silver
- Ulcers with extensive necrosis requiring surgical debridement

2.3 Randomization and Study Groups

Patients were randomized using a computer-generated sequence into:

- **Group 1 (Conservative Dressings):** Standard gauze, hydrocolloid, or foam dressings
- **Group 2 (Papain-Urea & Silver Colloid Dressings):** Combination dressing using papain-urea enzymatic gel followed by application of a silver colloid antimicrobial dressing

Outcome assessors were blinded to the treatment group allocation to reduce bias.

2.4 Outcome Measures

Primary Outcome:

- Wound healing rate, quantified as the percentage reduction in wound area from baseline to Week 4 using standardized digital photography.

Secondary Outcomes:

- Infection rate determined by clinical signs (redness, warmth, purulent discharge)
- Pain levels measured by the Visual Analog Scale (VAS) during dressing changes
- Patient satisfaction assessed through a structured survey

2.5 Statistical Analysis

Data analysis was performed using SPSS software:

- **Continuous variables (healing rate, VAS scores):** Compared using independent t-tests
- **Categorical variables (infection rates, satisfaction levels):** Compared using chi-square tests
- A P-value < 0.05 was considered statistically significant.

3. Results

3.1 Case Studies

Case	Conservative Dressings Outcome	Papain-Urea & Silver Colloid Outcome
Venous Ulcer (65F)	15% reduction in wound size; infection noted at Week 3	40% reduction in wound size; no infection
Diabetic Foot Ulcer (72M)	10% reduction; mild infection present	60% reduction; no infection
Pressure Ulcer (58M)	20% reduction; necrotic tissue persisted	50% reduction; clean granulation tissue observed

3.2 Statistical Analysis Summary

Outcome	Conservative Dressings	Papain-Urea & Silver Colloid	P-value
Healing Rate (4 weeks)	25% wound size reduction	50% wound size reduction	$P < 0.01$
Infection Rate	35%	5%	$P < 0.05$
Pain Level (VAS Score)	6 (moderate pain)	2 (mild pain)	$P < 0.01$
Patient Satisfaction	60% reported satisfaction	90% reported satisfaction	$P < 0.05$

4. Discussion

The results of this study indicate that papain-urea and silver colloid dressings significantly improve wound healing outcomes compared to conventional conservative dressings. The accelerated wound closure observed in the papain-urea & silver colloid group is likely due to the synergistic effects of enzymatic debridement and the potent antimicrobial action of silver colloid. Reduced infection rates in this group underscore the importance of controlling microbial load in the wound bed, which is a critical factor in the healing process.

Additionally, patients in the papain-urea & silver colloid group reported lower pain levels during dressing changes. This may be attributed to the less traumatic nature of the dressing change process, facilitated by a moist wound environment that preserves tissue integrity. Higher patient satisfaction further supports the clinical benefits of these modern dressings.

While these findings are promising, the study has limitations, including a relatively small sample size and a follow-up period limited to four weeks. Future research should focus on long-term outcomes, cost-effectiveness analyses, and further exploration of the mechanisms underlying improved healing with papain-urea and silver colloid dressings.

5. Conclusion

This study demonstrates that papain-urea and silver colloid dressings offer a superior alternative to conventional conservative dressings for the treatment of chronic skin ulcers. They provide faster wound healing, better infection control, reduced pain during dressing changes, and higher patient satisfaction. Incorporating these dressings into clinical practice may significantly improve patient outcomes. Future studies

should extend the follow-up period and explore long-term benefits and cost implications.

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