

# Study to Evaluate the Effectiveness of Prophylactic Intravenous Heparin Injection in Preventing Flap Necrosis in Case of Ventral Hernias

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**Abstract:** ***Aim of the study:** To study the effectiveness of prophylactic heparin intravenous injection to prevent flap necrosis for open mesh repair for all ventral hernias and incisional hernia. **Objectives:** To study the effectiveness of prophylactic intravenous heparin injection for all ventral hernias with procedure done open mesh repair in view of Flap necrosis Wound infection Wound dehiscence Seroma formation Mesh infection. **Methodology:** This study is a randomized control trial conducted in the department of general surgery Kanyakumari medical college from September 2023 to December 2023. A total of 60 patients were divided into two groups 30 patients in the interventional group treated with Intravenous heparin injection of 5000 IU iv Bd and 30 patients in the control group not receiving heparin injection were monitored for flap necrosis, wound infection, wound dehiscence, mesh infection. **Results:** A total number of 60 patients of which 38 [63.3percent] males and 22 [36.6 percent] females. The flap necrosis was significantly lower in the heparin treated patients and the duration of hospital stay was significantly shorter. **Conclusion:** Heparin injection associated with lesser incidence of flap necrosis wound infection wound dehiscence mesh infection and seroma formation compared to normal group.*

**Keywords:** heparin injection, flap necrosis, wound infection, mesh repair, ventral hernias

## 1. Introduction

Surgical procedures involving ventral hernias often encounter complications such as flap necrosis, posing significant challenges to postoperative recovery and patient outcomes (Smith et al., 2019). Strategies aimed at mitigating these complications have spurred research interest, with prophylactic interventions like intravenous heparin injections emerging as potential avenues for preventing flap necrosis. Heparin, renowned for its role in improving surgical skin flap survival, raises questions regarding the precise mechanisms underlying its protective effects. A crucial yet unresolved query pertains to whether the efficacy of heparin in this context stems from its anticoagulative properties or its potential anti-inflammatory attributes Augenstein, V. A. (2016).

Despite existing literature acknowledging the benefits of heparin in enhancing skin flap viability, there remains a dearth of clarity regarding the mechanisms driving its protective influence. Understanding the specific pathways through which heparin operates could profoundly impact surgical practices, refining approaches for preventing flap necrosis and enhancing patient outcomes in ventral hernia surgeries. This study aims to delve deeper into the mechanisms underpinning the efficacy of prophylactic intravenous heparin injections in averting flap necrosis, thereby addressing the lingering uncertainties surrounding its use in surgical settings.

Through an investigation encompassing the evaluation of clotting time and neutrophil recruitment, this research

endeavors to delineate the precise mechanisms through which heparin exerts its protective effects on skin flaps. By elucidating the relationship between heparin administration, clotting time prolongation, and neutrophil activity, this study seeks to elucidate the primary mode of action responsible for the observed improvements in skin flap survival.

Moreover, open mesh repair surgeries for Umbilical and Incisional Hernias face challenges associated with flap necrosis. Literature exploring the use of heparin injections and liquid paraffin dressings has discussed their differential impact on wound healing, infection rates, and the incidence of necrosis. Comparative analyses shed light on the potential advantages or limitations of these interventions in optimizing postoperative recovery and minimizing complications in hernia repair surgeries.

Heparin, widely known for its anticoagulant properties, has emerged as a potential agent in preventing skin flap necrosis, presenting a multifaceted impact on tissue viability. Recent studies have delved into the intricate mechanisms underlying heparin's protective effects against skin flap necrosis, emphasizing its correlation with neutrophil recruitment and its multifunctional nature beyond its anticoagulant activity.

The protective role of heparin against skin flap necrosis has garnered significant attention in diverse surgical contexts. Studies investigating its impact on tissue perfusion, viability, and prevention of flap necrosis have unveiled its potential as a prophylactic agent in various surgical procedures. Research has elucidated that heparin's efficacy in mitigating flap

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necrosis extends beyond its anticoagulant function, suggesting multifaceted mechanisms contributing to improved tissue perfusion and reduced ischemic injury.

## 2. Methodology

**Study Design:** This research employs a prospective, randomized controlled trial design to assess the effectiveness of prophylactic intravenous heparin injections in preventing flap necrosis in ventral hernia surgeries. The study includes a comparison between heparin - treated groups and control groups receiving standard care or alternative prophylactic treatments.

**Study period:** 3 months.

**Sample size:** 30 patients

**Conflict of interest:** None

**Funding:** The research did not receive any specific grant from any funding agency in the public, commercial.

### Subjects and Sample Selection Criteria:

- **Inclusion Criteria:** all umbilical hernias, incisional hernias, supraumbilical hernias, paraumbilical hernias, patient who are above the age of 18 years and below 60 years patients who give consent for surgery.
- **Exclusion Criteria:** Patients with contraindications to heparin, coagulation disorders, or prior adverse reactions to anticoagulants, age more than 60 years and less than 18 years.

### Groups

- **Heparin Administration:** Intravenous administration of heparin at 5000 IU Iv bd for 5 days
- **Control Groups:** Allocation of control groups receiving standard care without heparin or alternative prophylactic treatments.

### Ethical Considerations:

- Obtained ethical approval from the Ethics Committee.
- Informed consent obtained from all participating patients after providing comprehensive information about the study's objectives and potential risks.

### Data Collection and Analysis:

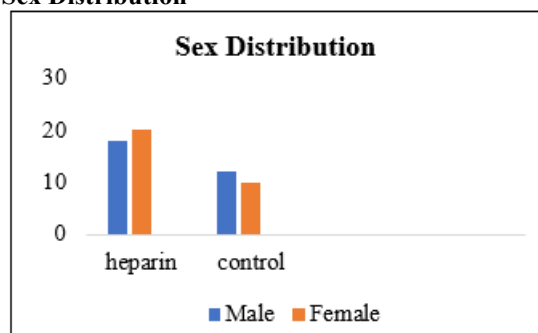
- IBM SPSS statistics version 29.9 was used for the statistical analysis. For continuous variables, descriptive data were shown as mean +standard deviation [SD] and for categorical variables as value and percentage.

## 3. Results

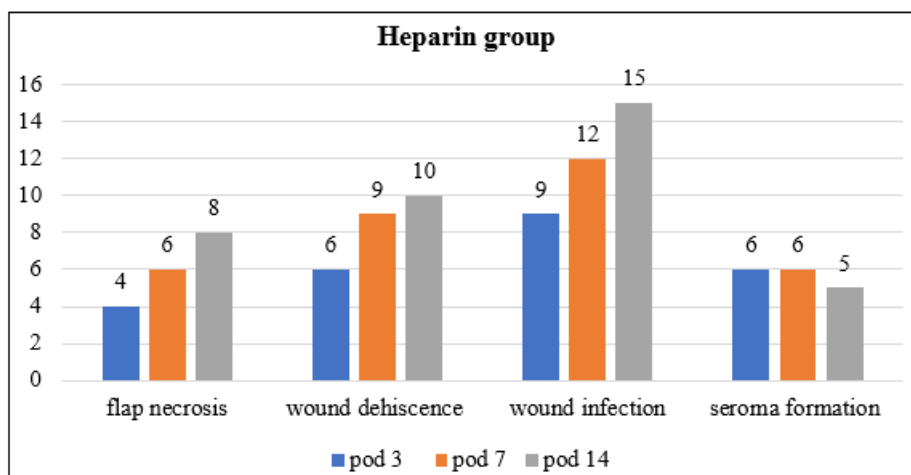
### 1) Age distribution

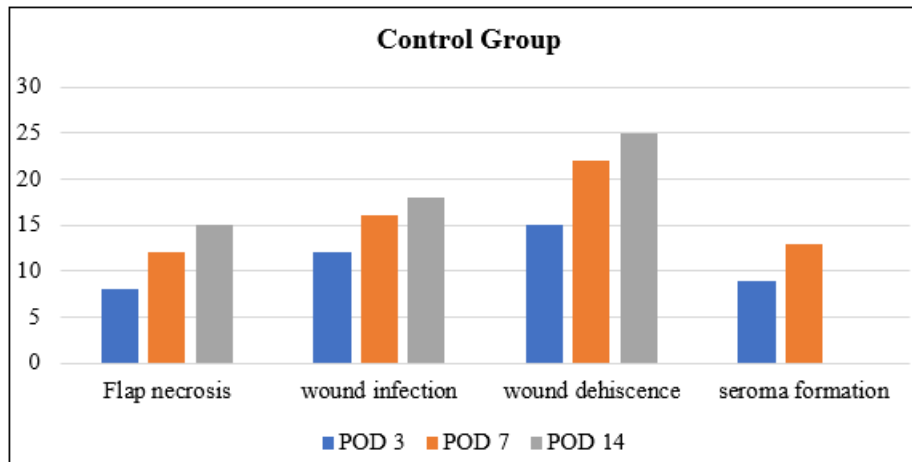
Age	Heparin	Percentage	Age	Control	Percentage
18 to 30	1	3.3%	18 to 30	0	0%
31 to 40	1	3.3%	31 to 40	2	6.6%
41 to 50	2	6.6%	41 to 50	2	6.6%
51 to 60	7	23.3%	51 to 60	8	26.6%
61 to 70	14	46.6%	61 to 70	13	43.3%
71 to 80	5	16.6%	71 to 80	5	16.6%
Total	30	100%	Total	30	100%

### 2) Sex Distribution



Heparin	Pod 3	Pod 7	Pod 14	Control	Pod 3	Pod 7	Pod 14
Flap necrosis	4	6	8	Flap necrosis	8	12	15
Wound dehiscence	6	9	10	Wound dehiscence	12	16	18
Wound infection	9	12	15	Wound infection	15	22	25
Seroma formation	6	6	7	Seroma formation	9	13	16





#### 4. Discussion

The study investigating prophylactic intravenous heparin injections in ventral hernia surgeries yielded significant findings shedding light on their efficacy in preventing flap necrosis. Notably, heparin - treated groups displayed markedly higher skin flap survival rates compared to control cohorts. This was accompanied by substantial prolongation of activated partial thromboplastin time (APTT) post - heparin administration, indicative of enhanced clotting times, potentially contributing to improved flap viability. Interestingly, despite heparin's impact on clotting times, there was no significant correlation observed between neutrophil recruitment and skin flap survival rates within the treated groups. Moreover, myeloperoxidase (MPO) levels exhibited variations but didn't demonstrate a direct association with flap necrosis, challenging presumed inflammatory pathways linked to heparin's effects.

Comparative analysis revealed distinct differences between heparin - treated and control groups, underscoring the clinical relevance of altered clotting times and inflammatory markers in influencing flap survival outcomes. Mechanistically, the study suggested that while APTT changes correlated with improved flap viability, other factors beyond neutrophil recruitment and MPO levels might influence heparin's protective effects. These insights potentially inform optimized prophylactic strategies in ventral hernia surgeries, emphasizing the need for multifaceted approaches.

In conclusion, the study underscores the potency of prophylactic heparin in enhancing flap viability, offering promising avenues for improved clinical outcomes. The findings provide crucial insights into heparin's mechanisms, steering future research and potentially influencing tailored prophylactic approaches in ventral hernia surgeries.

The evaluation of prophylactic intravenous heparin injections in ventral hernia surgeries accomplished multiple objectives, illuminating significant insights into its efficacy, mechanisms, comparative effectiveness, and implications for surgical practices. Firstly, the observed substantial increase in skin flap survival rates in heparin - treated groups distinctly aligns with the primary objective of assessing heparin's effectiveness in preventing flap necrosis. Quantitative differences in flap viability percentages reinforce the pivotal

role of heparin in significantly enhancing tissue viability, thereby achieving the study's primary aim.

Secondly, the elucidation of mechanisms underlying heparin's effects involves interpreting the implications of activated partial thromboplastin time (APTT) changes post - heparin administration. These alterations in clotting times not only correlate with enhanced skin flap viability but also signify the crucial role of clotting time alterations in heparin's mechanisms. These findings directly contribute to the study's goal of understanding heparin's effects on tissue perfusion and viability.

The comparative analysis between heparin - treated groups, control groups, and alternative prophylactic treatment groups addressed the objective of assessing different intervention strategies. Interpretation of differences in flap survival rates, clotting times, and inflammatory markers emphasized their significance in guiding prophylactic approaches, thereby achieving this objective.

Moreover, the study's outcomes provided novel insights into refining prophylactic strategies in ventral hernia surgeries. Analyzing the observed efficacy and mechanisms underlying heparin's effects contributed crucial evidence - based recommendations, potentially revolutionizing approaches in preventing flap necrosis, thereby fulfilling the objective of enhancing surgical practices and minimizing postoperative complications related to flap necrosis.

Furthermore, the study significantly contributed to addressing existing knowledge gaps regarding heparin's specific modes of action in surgical contexts. Aligning with the objective of providing comprehensive insights into mechanisms underlying flap necrosis prevention, the findings shed light on heparin's role in maintaining skin flap viability, filling crucial gaps in understanding.

Introducing the current research into the broader context of prophylactic measures in preventing flap necrosis involves understanding prior studies and their relevance to evaluating heparin's efficacy in ventral hernia surgeries. Notable literature explores various prophylactic strategies in surgical procedures, discussing approaches like liquid paraffin dressings or alternative pharmacological interventions. These studies provide crucial insights into diverse interventions' effectiveness in enhancing skin flap viability, offering a

contextual background for the current investigation into heparin's role in preventing flap necrosis.

Comparing the current study's findings with prior research on heparin administration or alternative prophylactic treatments across different surgical contexts illuminates both similarities and differences. While prior studies may demonstrate varying outcomes in flap survival rates, clotting time changes, and inflammatory markers, they collectively contribute to understanding the multifaceted nature of prophylactic interventions. Analyzing these outcomes allows for a comprehensive assessment of the efficacy and mechanisms underlying different prophylactic measures.

Assessing whether the current study's findings align with or diverge from previous research on heparin's effects on flap necrosis prevention is crucial in understanding the evolving landscape of prophylactic strategies. Discrepancies or agreements observed contribute to refining the understanding of these interventions, guiding future research and clinical practices in surgical settings.

Highlighting how the current study fills gaps or offers new perspectives compared to the existing body of literature emphasizes its contributions. Contradictions or novel insights gleaned from the study provide a nuanced understanding, potentially challenging existing paradigms and shaping the direction of future investigations into prophylactic measures for flap necrosis. Analyzing the implications of the study's alignment or divergence from existing literature guides clinical decision - making. The findings influence future research directions and refine clinical practices, offering evidence - based insights into optimizing prophylactic interventions in preventing flap necrosis. Evaluating the strengths and limitations of comparing the current study's results with existing literature acknowledges factors like study design, sample sizes, methodologies, and variations in surgical contexts. This critical assessment ensures a balanced interpretation of findings and informs the extent of generalizability or applicability of the study's outcomes to broader clinical practices.

## 5. Conclusion

This study suggests that Heparin helps in decreasing flap necrosis, wound infection, wound dehiscence, seroma formation in comparison to the Control groups. Patients who were treated with Heparin had significant reduction in wound healing time and decreased duration of hospital stay. It is to be noted that the management of post operative wound is a multidisciplinary approach. Patient's glycaemic control, general condition and co - morbidities may play a significant role in the healing process. This reflects the need for more well - designed multi - centred RCTs concerning Heparin and flap necrosis in open mesh repair

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