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Original Research Article

Comparative Study On Wound Healing Between Absorbable and Non-Absorbable Sutures in Clean Surgical Wounds

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Abstract:

Introduction: Wound closure critically affects healing, scar quality, and patient satisfaction. Absorbable and non-absorbable sutures offer distinct advantages, yet their comparative effectiveness remains debated. This study aimed to evaluate wound healing, infection rates, scar appearance, and patient satisfaction between absorbable (Vicryl) and non-absorbable (nylon) sutures in clean surgical wounds.

Methodology: This prospective randomized controlled trial was conducted from October 2024 to April 2025 in the department General Surgery at government Medical College, Mahabubabad. Patients aged 18–65 years undergoing elective clean surgeries were randomized to absorbable or non-absorbable sutures. Wound healing, infection, scar appearance, and satisfaction were systematically assessed.

Results: A total of 120 patients were included, with comparable baseline characteristics between groups. No significant differences were found in healing time, wound infection rates, or scar appearance. Patient satisfaction scores were similar between absorbable and non-absorbable suture groups, with 85% and 80% reporting high satisfaction, respectively.

Conclusion: Absorbable and non-absorbable sutures showed similar outcomes for wound healing, infection rates, scar appearance, and patient satisfaction in clean surgeries. Absorbable sutures offered greater patient comfort by avoiding suture removal. The choice of suture material should be individualized, focusing on surgical site needs and patient-centered care.

Keywords: Wound Healing, Absorbable Sutures, Non-Absorbable Sutures, Scar Quality, Patient Satisfaction.

Introduction

Wound closure is a critical component of surgical practice, directly influencing healing outcomes, scar formation, and patient satisfaction. Sutures are among the most commonly used devices for wound approximation, broadly classified into absorbable and non-absorbable types. Absorbable sutures, such as polyglactin 910 (Vicryl), degrade naturally and are absorbed by tissue, thereby eliminating the need for suture removal and potentially enhancing patient comfort. [1] Non-absorbable sutures, such as nylon, require manual removal but may provide prolonged tensile strength, which is particularly advantageous in certain anatomical areas. [2]

The choice between absorbable and non-absorbable sutures for skin closure in clean surgical wounds remains controversial. Some studies suggest that absorbable sutures are associated with similar or even lower infection rates compared to non-absorbable sutures, without compromising cosmetic outcomes. [3] In contrast, other reports indicate that non-absorbable sutures might reduce wound dehiscence and yield better scar quality in selected patient groups. [4]

Patient satisfaction, heavily influenced by cosmetic appearance and comfort, is another important parameter. The elimination of suture removal procedures when using absorbable sutures may positively impact the patient's overall experience. [5] Given these conflicting findings, a comparative evaluation of wound healing outcomes including infection rates, scar quality, and patient satisfaction between absorbable and non-absorbable sutures is crucial to guide surgical decision-making and optimize patient-centered care.

Methodology

This was a prospective randomized controlled trial conducted in the department of general surgery, government Medical College, Mahabubabad. Study was conducted from October 2024 to April 2025. Study protocol was approved by the Institutional Ethics committee. An informed written consent was taken from the study members.

Patients between 18 and 65 years who underwent elective clean surgical procedures, including open hernia repairs, laparoscopic port site closures, and minor soft tissue surgeries, were included in the study. Patients who had systemic infections or wound contamination, those with immunocompromised, those receiving steroid therapy, with known hypersensitivity to suture materials emergency surgical procedures were excluded from the study.

Patients were randomized into two groups. In Group A (Absorbable Suture Group), skin closure was performed using polyglactin 910 (Vicryl) sutures. In Group B (Non-absorbable Suture Group), skin closure was done using nylon sutures. Wound closure techniques were standardized among all operating surgeons to minimize technique-related variability. Several parameters were measured during the study. Time to wound healing was defined as complete epithelialization without discharge and was assessed clinically during follow-up visits on postoperative days 7, 14, and 30. Wound infection was evaluated based on CDC criteria, including the presence of purulent discharge, erythema, warmth, or isolation of pathogenic organisms from the wound; wound cultures were obtained if infection was suspected. [6] Scar appearance was assessed at three months postoperatively using the Vancouver Scar Scale (VSS), measuring pigmentation, vascularity, pliability, and height, with lower scores indicating better cosmetic outcomes. Need for suture removal was recorded in patients from the non-absorbable group, with removal typically performed between postoperative days 7 and 10 according to standard protocols. Patient satisfaction was measured at one-month follow-up using a simple visual analog scale (VAS) ranging from 0 (not satisfied) to 10 (completely satisfied).

The follow-up schedule included assessments on postoperative day 7 (clinical examination for healing and infection), day 14 (further wound healing evaluation), day 30 (final wound healing and preliminary scar assessment), and at three months (detailed scar evaluation using VSS and recording of patient satisfaction). Sample size estimation, based on previous studies, assumed a wound infection rate difference of 10% between groups. Considering a study power of 80% and a significance level of 5%, a minimum of 60 patients per group was determined to be necessary.

Statistical Analysis: Data were analyzed using SPSS software. Continuous variables, such as time to healing and scar scores, were compared using student's t-test. Categorical variables, including infection rates, were compared using the Chi-square test. $P < 0.05$ was considered statistically significant.

Results

Total 120 members were included; 60 (100%) in each group. The baseline characteristics of the study population were comparable between group A and group B (Table 1). The mean age was 42.5 ± 11.2 years in group A and 43.1 ± 10.8 years in group B (P = 0.72). The male-to-female ratio was similar (35/25 vs. 33/27; P = 0.68). Distribution of surgical procedures was also comparable, including hernia repair (P = 0.74), laparoscopic port closure (P = 0.68), and minor soft tissue surgeries (P = 1.00). Wound healing outcomes were summarized in Table 2. The mean time for complete healing was 13.2 ± 2.5 days in group A and 12.9 ± 2.3 days in group B (P = 0.58). Wound infection occurred in 6.7% of patients in group A and 8.3% in group B (P = 0.72). The mean VSS score was 3.1 ± 0.8 in group A and 2.9 ± 0.9 in group B (P = 0.30). As shown in Table 3, the mean satisfaction score was 8.5 ± 1.1 in group A and 8.2 ± 1.3 in group B (P = 0.24). The proportion of highly satisfied patients was 85% (51) in group A and 80% (48) in group B, with no significant difference (P = 0.47).

Table 1: Baseline characteristics of the study population

Parameter	Group A	Group B	P value
Age	42.5 ± 11.2	43.1 ± 10.8	0.72
Male/Female	35/25	33/27	0.68
Hernia repair	30	32	0.74
Laparoscopic port closure	20	18	0.68
Minor soft tissue surgery	10	10	1

Table 2: Comparison of wound healing outcomes

Parameter	Group A	Group B	P value
Time for complete healing	13.2 ± 2.5	12.9 ± 2.3	0.58
Wound infection; n (%)	4 (6.7)	5 (8.3)	0.72
VSS score	3.1 ± 0.8	2.9 ± 0.9	0.3

Table 3: Patient satisfaction scores			
Parameter	**Group A**	**Group B**	**P value**
Satisfaction score	8.5 ± 1.1	8.2 ± 1.3	0.24
Highly satisfied; n (%)	51 (85)	48 (80)	0.47

Discussion

In the present study, baseline characteristics between Group A and Group B were statistically comparable, ensuring homogeneity between the groups. The mean age was 42.5 ± 11.2 years in Group A and 43.1 ± 10.8 years in Group B (P = 0.72), indicating that age distribution did not influence the wound healing outcomes significantly. Age is an important factor affecting tissue repair and wound healing capacity, and ensuring similar age groups across study arms minimizes bias. [7]

Gender distribution was also similar between the groups, with a male-to-female ratio of 35/25 in Group A and 33/27 in Group B (P = 0.68). Studies have suggested that gender differences might influence wound healing, as hormonal and vascular differences can affect the inflammatory and repair processes. [2] Thus, balanced gender representation strengthens the internal validity of the study. Regarding the type of surgery performed, both groups had comparable distributions for hernia repair, laparoscopic port closure, and minor soft tissue surgeries (P > 0.05 for all categories). Since different surgeries may have varied healing timelines and complication rates, maintaining uniformity in surgical types across groups is crucial for reliable comparison. Similar operative profiles between the groups allowed for a fair assessment of the effects of suture material alone on wound outcomes, independent of surgical complexity. [9] Overall, the similarity in baseline demographic and surgical parameters supports the validity of the subsequent comparisons made between absorbable and non-absorbable sutures.

The time for complete healing was 13.2 ± 2.5 days in Group A and 12.9 ± 2.3 days in Group B (P = 0.58), indicating similar healing rates between the groups. These findings align with previous studies that reported no significant differences in wound healing duration when comparing absorbable and non-absorbable materials for skin closure. [10] Healing time is influenced by multiple factors, including suture material properties, tissue handling, and patient-specific variables such as nutritional status and comorbidities. [7] Since the baseline characteristics were comparable, the similarity in healing time reinforces the role of both materials as effective choices for clean surgical wound closure.

The wound infection rate was 6.7% in Group A and 8.3% in Group B, with no significant difference (P = 0.72). This supports earlier findings where wound infection rates were found to be independent of suture type in clean surgeries. [11] Moreover, the low infection rates observed in both groups reflect adherence to aseptic surgical techniques and proper wound care practices. While some older studies suggested a higher risk of infection with multifilament absorbable sutures due to bacterial adherence [12], modern absorbable sutures like polyglactin 910 have been engineered to minimize such risks by improving handling properties and reducing capillarity.

The scar appearance, assessed by the VSS, also showed no significant difference between groups. The mean VSS score was 3.1 ± 0.8 for Group A and 2.9 ± 0.9 for Group B (P = 0.30). Lower VSS scores reflect better cosmetic outcomes. Previous comparative studies reported that absorbable sutures could achieve cosmetic results equivalent to non-absorbable sutures when appropriate techniques are used. [4]. The marginal difference seen in this study favors non-absorbable sutures slightly; however, it was not statistically significant. The Vancouver Scar Scale, by evaluating pigmentation, vascularity, pliability, and scar height, provides a reliable multidimensional scar assessment rather than relying solely on subjective cosmetic opinion. Overall, these results suggest that absorbable sutures such as Vicryl are a suitable alternative to non-absorbable sutures like nylon for clean surgical wound closure, providing similar wound healing timelines, low infection rates, and satisfactory scar quality. Additionally, the use of absorbable sutures could enhance patient comfort by eliminating the need for suture removal, an important consideration for patient-centered surgical care.

Patient satisfaction is an important outcome measure in modern surgical practice, as it reflects not only clinical success but also the patient's perception of care quality. In the present study, the mean satisfaction score was 8.5 ± 1.1 in Group A (absorbable sutures) and 8.2 ± 1.3 in Group B (non-absorbable sutures), with no statistically significant difference (P = 0.24). Furthermore, 85% of patients in Group A and 80% of patients in Group B reported being highly satisfied with their surgical wound outcomes (P = 0.47). These results are consistent with previous studies which reported comparable levels of patient satisfaction between absorbable and non-absorbable suture groups in clean wound closures. [10] Absorbable sutures potentially offer a convenience advantage by eliminating the discomfort and logistical burden of suture removal, which may positively influence patient satisfaction, especially in outpatient settings. [13]

Although non-absorbable sutures have traditionally been considered the standard for external skin closure due to their durability and minimal inflammatory response, studies have shown that with careful technique, absorbable sutures can provide equally satisfactory cosmetic and functional outcomes. [11] The absence of significant differences in satisfaction scores suggests that other factors such as scar appearance, pain during recovery, ease of postoperative care, and patient expectations also play substantial roles. Importantly, incorporating patient-centered outcomes like satisfaction scores into clinical research aligns with the current emphasis on holistic healthcare, improving overall surgical quality and patient trust in treatment processes.

Conclusion

In this study comparing absorbable and non-absorbable sutures for clean surgical wound closure, no significant differences were observed between the groups in terms of wound healing time, infection rates, scar appearance, or patient satisfaction. Both suture types demonstrated comparable clinical effectiveness and cosmetic outcomes. Absorbable sutures, like Vicryl, provided the additional advantage of eliminating the need for suture removal, improving patient comfort and convenience. These findings support the use of either suture type based on surgical preference and patient needs, emphasizing that careful technique and proper wound care remain critical for optimal healing regardless of the material used.

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