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ABSORBABLE VERSUS NON-ABSORBABLE SUTURES FOR WOUND CLOSURE: A PROSPECTIVE COMPARATIVE STUDY OF SURGICAL SITE INFECTION, WOUND HEALING, AND PATIENT SATISFACTION

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ABSTRACT

Background: The choice of suture material for wound closure influences healing trajectory, infection risk, and patient-reported outcomes. Absorbable and non-absorbable sutures have distinct biomechanical and biological profiles, but high-quality comparative data on surgical site infection (SSI), wound healing, and patient satisfaction between the two classes remain limited in the Indian surgical context. This study prospectively compared these outcomes between absorbable (polyglactin 910) and non-absorbable (polypropylene) sutures for skin and subcutaneous closure.

Methods: We conducted a prospective, randomised comparative study of 100 consecutive patients undergoing elective general surgical procedures (appendicectomy, herniorrhaphy, laparotomy for benign disease) at Saveetha Medical College and Hospital, Chennai. Computer-generated randomisation allocated 50 patients to absorbable (polyglactin 910 / Vicryl, 2-0 or 3-0) and 50 to non-absorbable (polypropylene / Prolene, 2-0 or 3-0) sutures for subcutaneous and skin closure. Adults aged 18–65 years, ASA grade I or II, with elective clean or clean-contaminated wounds, were included. The primary outcome was SSI rate (CDC 2017 definition); secondary outcomes included REEDA scale wound-healing score at Days 7, 14, 21, and 30, visual analogue scale (VAS) pain score, patient satisfaction (cosmesis, overall) on a 10-point Likert scale, and scar quality (Manchester Scar Scale) at 30 days. Data were analysed in SPSS v26 using the chi-square test, Student's t-test, and Mann-Whitney U test, with $p<0.05$ considered significant.

Results: The two groups had comparable baseline demographics (mean age 38.6 ± 11.2 years; male:female ratio 1.4:1; $p>0.05$). The overall SSI rate was significantly lower in the absorbable group (8.6% vs 14.3%; $p=0.048$), driven by lower superficial (6.2% vs 10.8%) and deep (2.4% vs 3.5%) SSI rates. Mean time to complete wound healing was shorter in the absorbable group (18.4 vs 21.7 days; $p=0.032$). VAS pain was significantly lower (3.2 vs 4.6; $p=0.022$) and cosmetic satisfaction significantly higher (7.8 vs 6.9; $p=0.039$) in the absorbable group. REEDA wound-healing scores were numerically higher in the absorbable group at all four time points, reaching statistical significance at Days 14 and 21 ($p=0.041$ and $p=0.028$); because higher REEDA scores conventionally indicate greater tissue trauma and poorer wound appearance, this specific finding is difficult to reconcile with the study's other results and with its overall conclusion, and requires clarification (see Discussion).

Conclusion: Absorbable sutures were associated with a significantly lower SSI rate, faster overall wound healing, less postoperative pain, and higher cosmetic satisfaction than non-absorbable sutures in this cohort. However, the REEDA-scale findings appear internally inconsistent with the direction of the study's other outcomes and should be verified against the primary dataset before this study is used to support a general recommendation for absorbable sutures in elective general surgical wound closure. These findings should also be considered alongside existing systematic reviews and meta-analyses, which have generally found no significant difference in infection or cosmetic outcomes between suture classes.

KEYWORDS: Absorbable sutures; non-absorbable sutures; surgical site infection; wound healing; REEDA scale; patient satisfaction; randomised study

INTRODUCTION

Wound closure is a fundamental surgical skill, and the choice of suture material profoundly influences healing trajectory, infection risk, and patient-reported outcomes. Sutures are broadly classified into absorbable (natural or synthetic) and non-absorbable materials, each with distinct biomechanical and biological profiles [1,2].

Polyglactin 910 (Vicryl) and poliglecaprone 25 (Monocryl) are the most widely used synthetic absorbable sutures. Vicryl is hydrolysed within 56–70 days and retains tensile strength for approximately 3–4 weeks; Monocryl retains tensile strength for approximately 7–14 days, with complete absorption by 91–119 days. Both obviate the need for suture removal, reducing patient inconvenience [1].

Polypropylene (Prolene), nylon, and silk are the principal non-absorbable materials in general use. Prolene offers high tensile strength and minimal tissue reactivity, making it a common choice for fascial and vascular closure; nylon retains

approximately 81% of its tensile strength at one year. Non-absorbable sutures require mandatory removal, which carries its own associated morbidity, including discomfort and, occasionally, stitch marks or cross-hatching [1,2].
Despite widespread clinical use of both suture classes, high-quality comparative data on SSI rates, wound-healing scores, and patient satisfaction remain limited in the Indian surgical context. International evidence is itself mixed: a meta-analysis of 19 randomised controlled trials found no significant difference between absorbable and non-absorbable sutures in wound infection, cosmetic outcome, scar formation, or patient satisfaction for general skin closure, albeit with somewhat better cosmetic results for intradermal absorbable sutures in subgroup analysis [5], and a more recent systematic review focused on facial wounds similarly found comparable clinical and aesthetic outcomes between the two suture classes [6]. This prospective study aims to address the local evidence gap directly, while its findings should be interpreted alongside this broader, largely null international literature.
The objectives of this study were: (i) to compare SSI rates between absorbable and non-absorbable suture groups; (ii) to assess wound healing using the REEDA scale at Days 7, 14, 21, and 30; and (iii) to evaluate patient satisfaction (pain, cosmesis, overall satisfaction) using validated scales.

2. METHODS

2.1 Study Design and Setting

This was a prospective, randomised comparative study conducted at Saveetha Medical College and Hospital, Chennai.

2.2 Sample Size and Randomisation

One hundred consecutive patients undergoing elective general surgical procedures (appendicectomy, herniorrhaphy, or laparotomy for benign disease) were enrolled. Computer-generated randomisation allocated 50 patients to absorbable sutures (polyglactin 910 / Vicryl, 2-0 or 3-0) and 50 to non-absorbable sutures (polypropylene / Prolene, 2-0 or 3-0) for subcutaneous and skin closure

2.3 Inclusion Criteria

Patients aged 18–65 years, ASA grade I or II, undergoing elective procedures with clean or clean-contaminated wounds, who provided informed written consent, were included.

2.4 Exclusion Criteria

Patients with immunosuppression, diabetes with HbA1c >8%, corticosteroid use, known keloid or hypertrophic scar diathesis, or emergency surgery were excluded.

2.5 Outcome Measures

The primary outcome was SSI rate, defined according to CDC 2017 criteria. Secondary outcomes were: wound-healing score on the REEDA scale (Redness, Edema, Ecchymosis, Discharge, Approximation) at postoperative Days 7, 14, 21, and 30; VAS pain score; patient satisfaction (cosmesis and overall) on a 10-point Likert scale; and scar quality on the Manchester Scar Scale at 30 days.
The REEDA scale scores each of five domains (redness, edema, ecchymosis, discharge, approximation) from 0 to 3, for a total range of 0–15; by convention, a higher total score indicates greater tissue trauma and poorer wound appearance, and a lower score indicates better healing [3].

2.6 Statistical Analysis

Data were analysed using SPSS version 26 (IBM Corp.). The chi-square test was used for categorical variables; Student's t-test or the Mann-Whitney U test was used for continuous variables, as appropriate to their distribution. A p-value <0.05 was considered statistically significant.

3. RESULTS

3.1 Baseline Characteristics

One hundred patients were enrolled (50 per group). The mean age was 38.6 ± 11.2 years, and the male:female ratio was 1.4:1. Baseline demographics were comparable between groups ($p>0.05$).

3.2 Surgical Site Infection

The overall SSI rate was significantly lower in the absorbable group than the non-absorbable group. This difference was consistent across both superficial and deep SSI subcategories, which summed exactly to the respective overall rates in each group.

Table 1. Surgical site infection rates by category and group (overall SSI p=0.048).

SSI category	Absorbable (Vicryl)	Non-Absorbable (Prolene)
Overall SSI rate	8.6%	14.3%
Superficial SSI	6.2%	10.8%
Deep SSI	2.4%	3.5%

3.3 Wound Healing

Mean time to complete wound healing was shorter in the absorbable group than the non-absorbable group (18.4 vs 21.7 days; p=0.032).

REEDA wound-healing scores, plotted over the four assessment days, were numerically higher (i.e., by conventional scoring, indicating more redness, edema, ecchymosis, discharge, or poorer approximation) in the absorbable group than the non-absorbable group at every time point, with the difference reaching statistical significance at Days 14 and 21 (p=0.041 and p=0.028, respectively). Approximate scores read from the study's own plotted data are shown in Table 2. [Authors: exact REEDA values and p-values for Days 7 and 30 were not stated in the source material; the figures below are approximate readings from the plotted chart and should be confirmed against the primary dataset, along with the apparent direction of this finding — see Section 4.1.]

Table 2. REEDA wound-healing scores by postoperative day (approximate values read from the source study's plotted chart; axis range as plotted was 0–10, whereas Methods specify a 0–15 scale — see Section 2.5).

Postoperative Day	Absorbable (Vicryl)	Non-Absorbable (Prolene)	P-value
Day 7	~3.9	~3.2	not reported
Day 14	~6.1	~5.3	0.041
Day 21	~8.1	~7.5	0.028
Day 30	~8.9	~8.6	not reported

3.4 Patient Satisfaction and Pain

VAS pain score was significantly lower in the absorbable group (3.2 vs 4.6; p=0.022), and cosmetic satisfaction was significantly higher in the absorbable group (7.8 vs 6.9; p=0.039). Overall satisfaction and scar-appearance scores were also numerically higher in the absorbable group, though exact values and p-values for these two measures were not stated in the source material; approximate values read from the study's own chart are given in Table 3.

Table 3. Patient satisfaction and pain scores by group.

Measure	Absorbable (Vicryl)	Non-Absorbable (Prolene)	P-value
Pain (VAS, 0–10)	3.2	4.6	0.022
Cosmetic satisfaction (/10)	7.8	6.9	0.039
Overall satisfaction (/10)	~8.1	~7.2	not reported
Scar appearance (/10)	~7.4	~6.7	not reported

4. DISCUSSION

4.1 Wound Healing and the REEDA Findings

The REEDA scale is a five-domain instrument (redness, edema, ecchymosis, discharge, approximation), each scored 0–3, for a total range of 0–15; by its original and standard convention, a higher total score indicates greater tissue trauma and poorer wound appearance, and a lower score indicates better healing [3]. In this study, the absorbable group had numerically higher REEDA scores than the non-absorbable group at every assessed time point, reaching statistical significance at Days 14 and 21. Read at face value against the scale's standard direction, this would indicate that the absorbable group had more inflamed, less well-approximated wounds at these time points — the opposite of the interpretation offered in the source material, which described these higher scores as evidence of ‘superior wound apposition’ with polyglactin sutures. This interpretation is difficult to reconcile with the conventional scoring direction of the REEDA scale and also sits awkwardly alongside the study's other findings (lower SSI, shorter time to complete healing, less pain, and higher cosmetic satisfaction in the same absorbable group), which all point the opposite way. Several explanations are possible: the group labels on the REEDA chart may have been transposed; the intended comparison may have been ‘lower’ rather than ‘higher’; or the finding may be genuine and would, if so, warrant a more cautious overall conclusion about absorbable sutures than the source material draws. The authors should verify the REEDA data against the primary dataset and reconcile this apparent contradiction before this finding is presented in any subsequent publication.

Separately from the REEDA scores, mean time to complete wound healing was shorter in the absorbable group (18.4 vs 21.7 days; p=0.032), a finding that is directionally consistent with the study's other pro-absorbable results and does not share the same interpretive difficulty as the REEDA data.

4.2 Surgical Site Infection

The lower overall SSI rate in the absorbable group (8.6% vs 14.3%; p=0.048) is consistent with the proposed mechanism that reduced foreign-body reaction and earlier suture hydrolysis may limit the nidus available for biofilm formation and

bacterial colonisation. However, this finding should be weighed against a substantial body of existing evidence that has generally found no significant difference in infection rates between absorbable and non-absorbable sutures for skin closure: a meta-analysis of 19 randomised trials (1,748 patients) found no significant difference in wound infection between the two suture classes [5], and a more recent systematic review of facial wound closure reached a similar conclusion [6]. The present study's significant SSI difference may reflect true benefit in this specific population and wound-type mix, play of chance in a moderately sized single-centre trial, or unmeasured differences in surgical technique between operators; distinguishing between these possibilities would require a larger, multicentre trial.

4.3 Patient Satisfaction and Pain

Higher cosmetic satisfaction (7.8 vs 6.9; p=0.039) and lower VAS pain (3.2 vs 4.6; p=0.022) in the absorbable group are consistent with the well-recognised absence of suture-removal trauma, stitch marks, and cross-hatching associated with retained transcutaneous non-absorbable sutures [1,2]. These patient-reported outcomes are less subject to the interpretive ambiguity affecting the REEDA data, since higher satisfaction and lower pain scores unambiguously favour the absorbable group in the direction reported.

4.4 Strengths and Limitations

Strengths of this study include its prospective, randomised design and validated outcome measures. Limitations include its single-centre setting; a 30-day follow-up period that may underestimate long-term scar outcomes; heterogeneous wound types across three different procedures; and surgeon variability in suture technique that was not fully controlled. In addition to these limitations already identified in the source material, this analysis identified an apparent internal inconsistency in the REEDA wound-healing data (Section 4.1) and a discrepancy between the REEDA scale range stated in the Methods (0–15) and the range plotted in the Results (0–10); exact values for REEDA scores at Days 7 and 30, and for overall satisfaction and scar-appearance scores, were not available in the source material and were approximated from the study's own charts. A multicentre randomised trial with six-month scar assessment, and with these data points clarified, is warranted.

4.5 Clinical Implications and Future Directions

With the important caveat that the REEDA findings require clarification, the remaining results of this study — lower SSI, shorter time to complete healing, less pain, and higher cosmetic satisfaction — are broadly consistent with a preference for absorbable sutures in skin and subcutaneous closure for clean and clean-contaminated elective general surgical wounds, reducing patient burden associated with suture removal. Multicentre randomised trials with longer follow-up (3–6 months), patient-reported outcome measures, and health-economic analyses comparing the cost of suture materials against SSI-related morbidity are needed to inform evidence-based suture-selection protocols, and should incorporate independent verification of wound-scoring data of the kind flagged in this analysis.

5. CONCLUSION

In this prospective comparative study, absorbable sutures (polyglactin 910) were associated with a significantly lower surgical site infection rate, shorter time to complete wound healing, less postoperative pain, and higher cosmetic satisfaction than non-absorbable polypropylene sutures for skin and subcutaneous closure in elective general surgical procedures. However, the REEDA wound-healing scores reported in this study appear directionally inconsistent with both the scale's standard interpretation and the study's other findings, and should be verified before being used to support the conclusion of superior wound apposition with absorbable sutures. Taken together with a broader international literature that has generally found no significant difference between suture classes, these findings support cautious optimism about absorbable sutures for elective wound closure, pending confirmation in larger, multicentre trials with the data-quality issues identified here resolved.

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