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Research Article

Are Routine Wound Swabs Indicated Before Split-Thickness Skin Grafting? - A Retrospective Observational Study

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ABSTRACT
Background: Bacterial contamination is traditionally considered an important determinant of skin graft survival. While quantitative tissue cultures have demonstrated a relationship between bacterial burden and graft take, routine wound swab cultures are commonly performed even in clinically clean wounds. The benefit of this practice remains unclear.
Methods: A retrospective observational study was conducted between January 2023 and December 2024 in a tertiary care centre. Adult patients aged 18–50 years with clinically clean wounds measuring ≥15 × 10 cm and presenting 15–28 days after trauma were included. Patients were divided into two groups: Group A underwent routine pre-operative wound swab culture followed by culture-specific antibiotics, while Group B underwent grafting without routine wound swabs. All wounds were surgically debrided prior to split-thickness skin grafting. Graft take was assessed on postoperative days 2, 5, and 8.
Results: A total of 271 patients were analysed (Group A: 133; Group B: 138). Nearly half of clinically clean wounds (48.9%) in Group A showed no bacterial growth. Mean graft take was comparable between Group A and Group B (72.4% vs 73.7%; p = 0.299). No statistically significant association was observed between routine wound swabbing and graft take.
Conclusion: Routine wound swab cultures do not improve graft take in clinically clean wounds. Meticulous surgical debridement remains the most important determinant of successful skin grafting.

Keywords: Split-Thickness Skin Graft, Wound Swab, Graft Take, Wound Infection.

INTRODUCTION

Split-thickness skin grafting is one of the most commonly performed reconstructive procedures for coverage of traumatic and post-excisional wounds. Graft survival depends on plasmatic imbibition, inosculation, and subsequent neovascularization from the recipient wound bed. Failure at any of these stages can result in partial or complete graft loss.

Bacterial contamination of the wound has long been recognized as an important factor influencing graft survival. Early experimental studies demonstrated that bacterial loads exceeding 10^5 organisms per gram of tissue significantly reduce graft take [1, 2]. These observations, however, were primarily based on quantitative tissue biopsy cultures rather than routine wound swabs.

In everyday clinical practice, wound swab cultures are frequently obtained prior to skin grafting, even in wounds that appear clinically clean. This practice often leads to the administration of empiric or culture-directed antibiotics. While microbiological evaluation is clearly indicated in clinically unhealthy wounds—characterized by purulent discharge, exuberant granulation tissue, surrounding erythema or induration, or systemic signs of infection—the role of routine wound swabbing in clinically clean wounds is less clear.

Qualitative wound swabs may reflect surface colonization rather than true tissue invasion and may not reliably predict graft outcomes. Moreover, indiscriminate antibiotic use contributes to antimicrobial resistance and increases healthcare costs. Despite the widespread use of routine wound swabs, there is limited evidence demonstrating a tangible benefit in terms of improved graft take.

This study was undertaken to evaluate whether routine pre-operative wound swab cultures, coupled with culture-specific antibiotic therapy, improve graft outcomes in clinically clean wounds undergoing split-thickness skin grafting.

MATERIALS AND METHODS

Study Design and Setting

This retrospective observational study was conducted over a two-year period from January 2023 to December 2024 at a tertiary care hospital. Two surgical units with comparable operative techniques and postoperative care protocols participated in the study.

Patient Selection

Adult patients aged 18–50 years undergoing split-thickness skin grafting were screened. Inclusion criteria were clinically clean wounds measuring at least 15 × 10 cm (maximum dimensions) and presenting between 15 and 28 days after trauma.

Patients were excluded if there was clinical evidence of local wound infection, systemic sepsis, peripheral vascular disease, immunocompromised status, prior skin cover procedures, or the use of adjuvant wound bed preparation techniques.

Group Allocation

Patients were divided into two groups based on unit practice:

- **Group A:** Routine pre-operative wound swab culture followed by five days of culture-specific antibiotic therapy.
- **Group B:** No routine wound swab culture in clinically clean wounds.

Surgical Technique

All wounds underwent thorough surgical debridement with removal of non-viable tissue and meticulous hemostasis. Split-thickness skin grafts were harvested using a Humby knife and secured with 3-0 nylon sutures. Standard dressings were applied, and immobilization was achieved using plaster of Paris splints where appropriate.

Postoperative Assessment

Grafts were inspected on postoperative days 2, 5, and 8. Graft take was assessed clinically and recorded as the percentage of viable grafted area.

Data Collection and Statistical Analysis

Data collected included demographic variables, wound characteristics, culture results (Group A), and graft take. Statistical analysis was performed using SPSS version 26 (IBM Corporation, 2019). Continuous variables were summarized using mean, standard deviation, median, and range. Categorical variables were expressed as frequencies and percentages. Independent sample t-tests, ANOVA, and chi-square tests were used as appropriate. A p-value <0.05 was considered statistically significant.

RESULTS

Demographic and Wound Characteristics

A total of 271 patients met the inclusion criteria, with 133 patients in Group A and 138 in Group B. The mean age of the cohort was 35.9 ± 7.03 years, with a median age of 32 years (range 18–50 years). Males constituted 83.4% of the study population. Baseline demographic characteristics are summarized in Table 1.

Table 1. Demographic Profile of the Study Population

Variable	Value
Total patients	271
Mean age (years)	35.9 ± 7.03
Median age (years)	32
Male	226 (83.4%)
Female	45 (16.6%)

Lower limb wounds were most common (64.6%), followed by upper limb wounds (33.6%). Perineal and head-and-neck wounds were uncommon (Table 2).

Table 2. Distribution of Wound Sites

Site	Number (%)
Lower limb	175 (64.6%)
Upper limb	91 (33.6%)
Perineum	4 (1.4%)
Head and neck	1 (0.4%)

Culture Results and Graft Take

Among patients in Group A, 48.9% of clinically clean wounds demonstrated no bacterial growth. When organisms were isolated, *Staphylococcus aureus*, *Pseudomonas aeruginosa*, and *Acinetobacter* species were most frequently identified.

Mean graft take was 72.4% in Group A and 73.7% in Group B. The difference was not statistically significant (Table 3). Subgroup analysis revealed no significant association

between routine wound swab culture and graft take ($\chi^2 = 3.675$; df = 3; p = 0.299).

Table 3. Comparison of Graft Take Between Study Groups

Group	Number of patients	Mean graft take (%)
Group A (culture)	133	72.4
Group B (no culture)	138	73.7

Lower graft take was observed in wounds yielding *Acinetobacter* species, although the number of such cases was small. Wounds yielding *Staphylococcus aureus* or *Pseudomonas aeruginosa* were also associated with relatively reduced graft take.

Discussion

The relationship between bacterial burden and skin graft survival has been well established, particularly in studies employing quantitative tissue cultures [1,2]. However, the relevance of qualitative wound swab cultures in predicting graft outcomes remains controversial.

In the present study, nearly half of clinically clean wounds showed no bacterial growth, highlighting the limited diagnostic yield of routine wound swabbing. More importantly, graft take was comparable between patients managed with and without routine wound cultures, even when culture-specific antibiotics were administered.

These findings support the concept that bacterial colonization detected by wound swabs does not necessarily represent clinically significant infection. Several studies have shown comparable microbiological yields between wound swabs and tissue biopsies [5,6], yet their utility in predicting clinical outcomes remains uncertain. Colonization rather than infection is likely the predominant state in clinically clean wounds.

Reduced graft take observed with organisms such as *Acinetobacter*, *Staphylococcus aureus*, and *Pseudomonas aeruginosa* is consistent with previous reports [3]. However, the small sample size in these subgroups limits definitive conclusions. Importantly, routine swabbing did not translate into improved outcomes at a population level.

The findings underscore the importance of meticulous surgical debridement and optimal wound bed preparation. As often stated, "the surgeon's knife is the best antibiotic." Routine wound swabbing in clinically clean wounds may represent an unnecessary investigation without demonstrable benefit.

Strengths and Limitations

The principal strength of this study lies in its direct comparison of clinically clean wounds managed with and without routine wound swab cultures, an area with limited existing literature. The relatively large sample size and standardized surgical technique enhance the reliability of the findings.

Limitations include the retrospective design and reliance on qualitative wound swab cultures rather than quantitative tissue biopsies. Additionally, organism-specific subgroup analyses were limited by small numbers.

CONCLUSION

Routine pre-operative wound swab cultures do not improve graft take in clinically clean wounds undergoing split-thickness skin grafting and are unnecessary. Wound cultures should be reserved for wounds with clinical evidence of infection. Meticulous surgical debridement remains the cornerstone of successful graft take.

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