



A PROSPECTIVE RANDOMISED COMPARATIVE STUDY OF APPLICATION OF COLLAGEN DRESSING AND SECONDARY SUTURING IN THE MANAGEMENT OF POST OPERATIVE WOUND GAPING

General Surgery

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ABSTRACT

This prospective randomized comparative study evaluates the efficacy of collagen dressings versus secondary suturing in the management of postoperative wound gaping. Conducted at a tertiary care hospital with 100 patients, the study compares healing time, pain, infection rates, scar quality, patient compliance, and hospital stay between the two treatment modalities. Results indicate that collagen dressings significantly reduce postoperative pain, accelerate healing, and shorten hospital stay compared to secondary suturing, while maintaining comparable infection rates and scar quality. Patient compliance was notably higher with collagen dressings. The findings support the use of collagen dressings as a safe, effective, and patient-friendly alternative or adjunct to conventional secondary suturing for postoperative wound management.

KEYWORDS

Collagen dressing, Secondary suturing, Postoperative wound gaping, Wound healing, Randomized comparative study

INTRODUCTION:

Postoperative wound management is a vital component of surgical care, aimed at preventing complications such as surgical site infections and wound dehiscence that can significantly hinder recovery and strain healthcare resources. Effective wound closure techniques and postoperative care promote optimal healing, reduce pain, and lower infection risk, with sutures traditionally serving as the standard method by mechanically approximating wound edges. More recently, alternative modalities like collagen dressings have emerged, demonstrating promising potential in further enhancing wound healing outcomes. (1-3).

Wound healing involves three phases: inflammatory, proliferative, and remodeling, characterized by hemostasis, inflammation, tissue formation, and maturation. Primary intention healing, with direct wound edge approximation, promotes faster healing and less scarring, while secondary intention heals by granulation and epithelialization, leading to longer recovery and more scarring. Secondary intention is common in postoperative wound gaping when edges fail to stay approximated. (4,5).

Collagen, comprising 25-30% of total body protein and 70-80% of skin protein, provides structural integrity to connective tissues and serves as a scaffold for cellular migration, angiogenesis, and extracellular matrix formation in wound healing. Collagen dressings from bovine, porcine, or avian sources promote granulation, modulate MMPs, and enhance re-epithelialization, offering biocompatibility, non-immunogenicity, ease of use, and pain reduction as alternatives to traditional closure methods (6-10).

Wound care has evolved from ancient natural materials to modern moist healing and bioengineered products, with collagen dressings introduced in the late 19th/early 20th centuries and advanced through purification in the late 20th century. These dressings have proven effective in surgical specialties like burns, chronic wounds, and reconstructive surgery, accelerating healing and reducing complications compared to traditional methods (11-14).

Suturing techniques have a long-standing history in surgical practice, with various materials and methods developed to optimize wound closure. Sutures are classified based on absorbability, material composition, and filament structure, each influencing tissue response and healing outcomes. While sutures provide mechanical strength and precise tissue approximation, they may be associated with postoperative pain, infection risk, and scarring, particularly in secondary suturing of gaping wounds. Advances in suture technology and techniques aim to mitigate these drawbacks, but alternative biological dressings like collagen are gaining attention for their potential to enhance healing and patient comfort (15,16).

Surgical site infections remain a major concern, contributing to morbidity, prolonged hospital stay, and increased healthcare costs. Risk factors include patient-related variables such as age,

comorbidities (e.g., diabetes, malnutrition), and procedural factors like surgical technique and wound contamination. Collagen dressings have demonstrated the ability to reduce infection rates by providing a physiological barrier, binding and inactivating MMPs, and promoting a favourable wound environment. Comparative studies suggest that collagen dressings may lower postoperative infection incidence relative to secondary suturing, supporting their role in improved wound management strategies (17,18).

Postoperative wound gaping, where wound edges fail to remain approximated, presents clinical challenges, with secondary suturing risking increased pain, longer healing, and higher infection rates. Collagen dressings provide a promising alternative by promoting granulation and accelerating healing without invasive re-suturing. Prospective randomized studies, including this one, compare these approaches to guide evidence-based postoperative wound care. (19).

In summary, the integration of collagen dressings into postoperative wound management represents an advancement that addresses limitations of conventional secondary suturing. By promoting faster healing, reducing pain, and minimizing infection and scarring, collagen dressings may improve patient outcomes and healthcare efficiency. Continued research and clinical trials are essential to validate these benefits and optimize protocols for their use in diverse surgical settings (20)

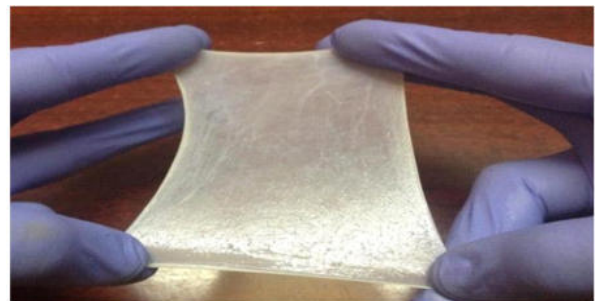


Fig: Collagen Dressing

AIMS AND OBJECTIVES

To compare the efficacy of application of collagen dressing and secondary suturing in the management of post-operative wound gaping.

Problem Definition

Postoperative wound gaping (dehiscence) occurs in 0.5–3.4% of major abdominal/pelvic surgeries and 1.5–2.2% of obstetric/gynecological procedures, increasing morbidity, mortality, and costs, with risk factors including infection, anemia, obesity, diabetes, hypoproteinemia, and emergency surgery, typically presenting in the first 1–2 postoperative weeks. Conventional secondary suturing reapproximates edges but often involves significant pain, prolonged

hospital stays, higher resource use, and variable infection/scar outcomes. While collagen dressings show faster granulation, less pain, and shorter healing in burns/ulcers/chronic wounds, their role in postoperative gaping lacks robust comparative evidence against suturing for pain, healing time, infection, scarring, and stay, hindering evidence-based protocols.(25,26)

METHODOLOGY

This prospective randomized comparative study was conducted at the Department of General Surgery, Madha Medical College and Research Institute, Chennai from November 2023 to September 2025. The study included 100 patients clinically diagnosed with postoperative wound gaping who met the inclusion criteria. Ethical clearance was obtained from the institutional ethical committee prior to commencement.

Inclusion Criteria:

All patients presenting with postoperative wound gaping.

Exclusion Criteria:

Patients with systemic diseases known to interfere with wound healing such as diabetes mellitus, malignancies, or those on long-term steroid therapy.

Cases of burst abdomen.

Patients with sepsis.

Study Groups:

Patients were randomized into two groups of 50 each:

Group A: Patients managed with application of collagen dressing.

Group B: Patients managed with secondary suturing.

After obtaining written informed consent, detailed history and clinical examination were performed for all patients. Routine investigations and systemic examinations were conducted to assess patient suitability.

Patients in Group A received collagen dressings applied to the wound site, while those in Group B underwent secondary suturing to reapproximate wound edges.

Patients were followed up at 2nd, 4th, 6th, and 8th weeks post-intervention. During each follow-up, wound healing progress, granulation tissue formation, pain levels, infection incidence, scar quality, and patient compliance were assessed and documented.

Collected data were statistically analysed using SPSS. Comparative analyses between the two groups were performed to evaluate differences in healing time, pain scores, infection rates, compliance, scar outcomes, and hospital stay duration

RESULTS

The study included 100 patients with postoperative wound gaping, randomized equally into two groups: Group A (collagen dressing) and Group B (secondary suturing). The demographic distribution showed that in Group A, the mean age was 45.32 ± 12.69 years, with 72% males, while Group B had a mean age of 48.32 ± 15.21 years, with 64% males.

Regarding wound gaping onset, most patients in the collagen dressing group presented on the 7th day (34%), while in the secondary suturing group, the majority presented on the 6th and 7th days (26% each). The mean wound gaping scores were comparable between groups (6.34 ± 1.22 vs. 6.32 ± 1.28), with no statistically significant difference (p=0.937).

Pain assessment revealed a significantly lower mean pain score in the collagen dressing group (3.36 ± 0.94) compared to the secondary suturing group (5.40 ± 1.07), with a highly significant difference (p<0.001).

Infection rates were lower in the collagen group (2%) compared to the secondary suturing group (10%), though this difference was not statistically significant (p=0.092).

Table 1: Comparison Of The Healing Time In The Collagen Dressing Group And Secondary Suturing Group.

Healing time	Group	Mean	Standard Deviation	Mean Difference	't' Value student t test	'p' Value
	Collagen dressing	4.32	0.891	-5.060	-7.764	0.001**
	Secondary suturing	9.38	4.522			

The mean healing time was significantly shorter in the collagen dressing group (4.32 ± 0.89 days) than in the secondary suturing group (9.32 ± 4.52 days), demonstrating a significant difference (p<0.001).

Patient compliance was excellent in the collagen group, with 100% showing good compliance, compared to 88% in the secondary suturing group, a statistically significant difference (p=0.012).

Scar quality was rated as good in all patients in the collagen group and in 96% of patients in the secondary suturing group, with no significant difference (p=0.153).

Hospital stay duration was significantly shorter for patients treated with collagen dressing (mean 10.64 ± 1.63 days) compared to those undergoing secondary suturing (mean 15.66 ± 4.75 days) (p<0.001).

Overall, collagen dressing demonstrated superiority over secondary suturing in reducing pain, healing time, hospital stay, and improving patient compliance, while maintaining comparable outcomes in wound gaping, infection rates, and scar quality.

DISCUSSION

This prospective randomized comparative study evaluated the efficacy of collagen dressings versus secondary suturing in the management of postoperative wound gaping. The study enrolled 100 patients, equally divided into two groups, and assessed multiple clinical outcomes including pain, infection rates, healing time, scar quality, patient compliance, and hospital stay duration.

The demographic profile showed comparable distribution between groups, with mean ages of 45.32 ± 12.69 years in the collagen group and 48.32 ± 15.21 years in the secondary suturing group, and male predominance in both. These findings align with prior studies noting higher postoperative wound complications in middle-aged populations and males.(20).Wound gaping onset and severity were similar between groups, ensuring comparable baseline wound characteristics for fair treatment comparison. Mean wound gaping scores showed no significant difference (p=0.937), consistent with reports that wound size and timing are independent of closure technique. (21).

Pain assessment showed markedly lower mean pain scores in the collagen dressing group (3.36 ± 0.94) versus secondary suturing (5.40 ± 1.07), with highly significant difference (p<0.001). This aligns with evidence that collagen reduces nociceptive stimuli via biocompatibility, non-immunogenicity, and minimal tissue manipulation during changes. Secondary suturing exacerbates discomfort due to invasive reapproximating. (7). Infection rates were lower in the collagen group (2%) than secondary suturing (10%), though not statistically significant (p=0.092). This trend aligns with literature showing collagen dressings create a favourable microenvironment by binding/inactivating MMPs and providing a microbial barrier. Higher infection in suturing may stem from suture-related foreign body reaction and increased tissue handling.

Healing time was significantly shorter in the collagen group (mean 4.32 ± 0.89 days) versus secondary suturing (9.38 ± 4.52 days), with p<0.001. This supports studies showing collagen promotes granulation, angiogenesis, and re-epithelialization to accelerate closure. Shorter healing reduces hospital stay and resource use. (20,22) Patient compliance was excellent in the collagen group (100%) versus 88% in secondary suturing (p=0.012), likely due to ease of use, pain reduction, and fewer changes. Secondary suturing reduces compliance from discomfort and suture removal needs. Scar quality was good in collagen and high in suturing (96%), with no significant difference (p=0.153), suggesting collagen supports organized deposition without compromising cosmetics (7,23).

Hospital stay was significantly shorter in the collagen group (mean 10.64 ± 1.63 days) versus secondary suturing (15.66 ± 4.75 days)

($p < 0.001$). This reduction reflects faster healing, lower pain, and fewer complications, consistent with studies highlighting collagen dressings' economic and patient-centered benefits (24).

Collagen dressings showed superior outcomes in pain management, healing time, patient compliance, and hospital stay compared to secondary suturing, with comparable infection rates and scar quality. These benefits support integrating collagen dressings as an alternative or adjunct for postoperative wound gaping care. Study limitations include small sample size and single-center design limiting generalizability; larger multicenter RCTs are needed to validate findings and refine protocols.

Future Scope

Future research should include larger multicentre RCTs to confirm collagen dressings' superiority over secondary suturing across diverse populations and surgical specialties. Cost-effectiveness analyses are needed to quantify benefits from reduced healing time, shorter hospital stays, and better compliance with collagen dressings. Long-term studies with extended follow-up can assess scar maturation, functional recovery, and quality of life, especially in high-risk comorbid patients excluded here. Additional investigations should explore collagen dressings combined with other advanced modalities, standardized protocols for various wound gaping types/grades, and biomarkers plus patient-reported outcomes to elucidate underlying mechanisms.

CONCLUSION

This prospective randomized comparative study demonstrates that collagen dressings are superior to secondary suturing in the management of postoperative wound gaping. Collagen dressings significantly reduce postoperative pain, accelerate healing time, and shorten hospital stay while maintaining comparable infection rates and scar quality. The excellent patient compliance observed with collagen dressings further supports their feasibility and acceptability in clinical practice. By promoting granulation tissue formation and providing a favourable wound environment, collagen dressings enhance wound healing without the need for invasive re-suturing. Given these advantages, collagen dressings represent a safe, effective, and patient-friendly alternative or adjunct to conventional secondary suturing techniques. Future multicentre studies with larger sample sizes are recommended to validate these findings and optimize postoperative wound management protocols.

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Conflicts Of Interest: NIL

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