Section: Plastic Surgery

Case Series

STRETCHING SKIN, NOT BUDGET: THE CABLE TIE TECHNIQUE FOR AFFORDABLE WOUND CLOSURE IN 25 PATIENTS

Aditya Narayan Choudhary[1], Sanjeev Kumar[1]

[1]Assistant Professor, Department of Plastic Surgery, Heritage Institute of Medical Sciences, Varansi, Uttar Pradesh, India

Received : 10/11/2025
Received in revised form : 22/12/2025
Accepted : 12/01/2026

Keywords:
Cable ties, wound closure, skin stretching, low-cost surgery, delayed primary closure, India, resource-limited.

Corresponding Author:
Dr. Sanjeev Kumar,
Email: drsanjeev23@yahoo.com

DOI: 10.47009/jamp.2026.8.1.32

Source of Support: Nil,
Conflict of Interest: None declared

Int J Acad Med Pharm
2026; 8 (1); 157-161

ABSTRACT

Background: The closure of large wounds remains a significant surgical and economic challenge in resource-limited environments. This study evaluates the use of sterilized nylon cable ties as a low-cost, accessible top closure system for delayed primary wound closure. **Materials and Methods:** A prospective case series of 25 patients with large post-debridement, fasciotomy, or burn wounds was conducted. Sterile cable ties were applied and incrementally tightened daily. Outcomes included time to approximation, healing time, complications, functional recovery, and cost analysis. **Result:** Complete delayed primary closure was achieved in 23 patients (92%). Mean time to wound edge approximation was 8.2 days, with a mean approximation rate of 2.4 mm/day. Complete healing occurred at a mean of 20.3 days. No major complications were observed. The material cost per patient was less than ₹50 ($0.70 USD). **Conclusion:** Cable ties are a safe, effective, and ultra-low-cost alternative for wound closure in resource-constrained settings, leveraging skin biomechanics to facilitate healing without costly devices.

INTRODUCTION

In resource-limited surgical settings, managing large soft-tissue defects—due to trauma, burns, infections, or fasciotomies—presents significant clinical and financial challenges[1]. Conventional methods like skin grafts, flaps, or commercial tissue expansion systems are often unaffordable and require multiple procedures[2]. The viscoelastic and creep properties of skin allow for gradual mechanical stretching, enabling delayed primary closure under controlled tension[3,4]. While commercial devices exist, their high cost limits accessibility[5]. Inspired byprior reports on the use of cable ties for fasciotomy closure[6] and other low cost innovations in plastic surgery[7], this study explores the adaptation of sterilized nylon cable ties—a low-cost, widely available material—as a practical top closure system in a cohort of 25 patients.

MATERIALS AND METHODS

Study Design and Setting: A prospective observational case series was conducted at Heritage Institute of Medical Sciences, Varanasi from July 2022 to December 2023. Ethical approval was obtained, and written informed consent was secured from all participants.

Patient Selection:

Inclusion criteria

Adults ≥18 years with large wounds (>5 cm) after debridement or fasciotomy, healthy granulation tissue, no active infection, and adequate surrounding skin.

Exclusion criteria

Infected/necrotic wounds, peripheral vascular disease, uncontrolled comorbidities, or inability to follow up.

Technique: Sterile nylon cable ties were interconnected to form adjustable straps. After antiseptic wound preparation, straps were applied perpendicular to wound margins, spaced 1–1.5 cm apart, and secured with 3-0 nylon sutures or staplers [Figure 1]. The method was adapted from principles described by Govaert et al. [6] and earlier use of nylon straps in orthopaedics[8]. Daily tightening of 1–3 mm began after 24 hours, monitored for tissue tolerance. Once approximated, ties remained for 5–7 days before removal.

ISSN (O): 2687-5365; ISSN (P): 2753-6556

Figure 1: Wound at presentation

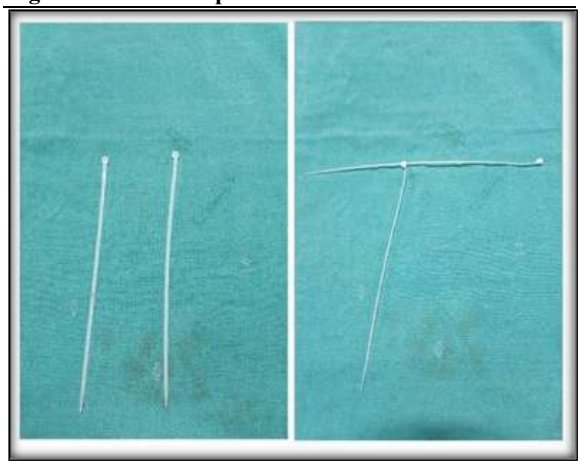

Figure 2: Cable tie system

Figure 3: Cable tie fixation to wound edges

Figure 4: Wound edge approximation

Figure 5: Wound edge apposition

Outcome Measures
Primary: time to approximation, closure rate, healing time.
Secondary: complications, functional recovery, cost.

ISSN (O): 2687-5365; ISSN (P): 2753-6556

Figure 6: Follow up at 2 months

Statistical Analysis

Descriptive statistics were applied. Continuous variables expressed as mean ± SD, categorical as frequency/percentage.

RESULTS

Patient and Wound Characteristics

A total of 25 patients (18 male, 7 female) with mean age 42.6 years were included. Wound etiologies are summarized in Table 1.

Table 1: Patient Demographics and Wound Characteristics

Case No.	Age (yr)	Gender	Wound etiology	Wound Location	Initial Wound size (cm)	Duration before Closure (Days)	Comorbidities	Smoking status
1	45	M	Post fasciotomy	Right leg	8x4	5	None	Non-smoker
2	32	M	Traumatic laceration	Left forearm	6x3	6	None	Smoker
3	50	F	Debrided abscess	Right thigh	7x5	7	Type II DM	Non smoker
4	38	M	Post fasciotomy	left leg	9x5	8	Hypertension	Non smoker
5	56	F	Debrided abscess	Abdominal wall	10x6	9	Obesity	Non smoker
6	29	M	Traumatic avulsion	Right knee	7x4	6	None	Smoker
7	60	M	Post fasciotomy	Left leg	11x5	10	CAD, Hypertension	Ex- smoker
8	42	F	Electric burn	scalp	10x7	12	None	Non smoker
9	27	M	Post traumatic	Right forearm	5x3	5	None	Smoker
10	48	M	Post fasciotomy	Right leg	8x4	7	None	Non smoker
11	33	F	Debrided burn	Dorsum of hand	6x4	8	None	Non Smoker
12	52	M	Post fasciotomy	Left forearm	9x4	9	Type II DM	Non smoker
13	44	M	Traumatic wound	Left thigh	7x5	6	Hypertension	Smoker
14	31	F	Debrided abscess	Gluteal region	8x6	7	None	Non smoker
15	39	M	Post fasciotomy	Right leg	10x5	11	None	Non smoker
16	25	M	Electric burn	Scalp	9x6	14	None	Non smoker
17	58	F	Post fasciotomy	Left leg	12x6	13	Hypothyroidism	Non smoker
18	47	M	Traumatic defect	Right arm	6x4	5	None	Smoker
19	36	F	Debrided abscess	Abdominal wall	8x5	7	None	Non smoker
20	41	M	Post fasciotomy	Right forearm	7x4	8	None	Non smoker
21	30	M	Traumatic laceration	Left leg	5x3	5	None	Smoker

ISSN (O): 2687-5365; ISSN (P): 2753-6556

22	55	F	Post- fasciotomy	Left leg	11x5	10	Type II DM, Hypertension	Non smoker
23	28	M	Debrided burn	chest wall	9x7	12	None	Non smoker
24	50	M	Traumatic wound	Right thigh	8x5	7	None	Smoker
25	34	F	Post fasciotomy	left leg	10x5	9	None	Non smoker

Wound Closure Outcomes: Complete delayed primary closure was achieved in 23 patients (92%). Mean initial wound length was 7.8 cm. Mean time to complete approximation was 8.2 days (range 5–14), with a mean daily approximation rate of 2.4 mm/day [Figure 2]. Complete healing occurred at a mean of 20.3 days post-application.

Complications: No major complications occurred. Minor issues included transient erythema (n=3) and mild discomfort during tightening (n=5). All patients retained full sensation and range of motion.

Cost Analysis: The cost per patient was less than ₹50 ($0.70 USD), compared to commercial systems costing ₹15,000–40,000, aligning with broader discussion on cost-effective surgery in low resource settings[7,9].

Table 2: Cost Comparison of Wound Closure Methods

Method	Estimated Cost per application (₹)	Notes
Cable tie system	<50	Material cost only
Skin graft	30000 - 45000	Includes OT charges
Commercial stretcher	15000 - 40000	Single use device
Flap reconstruction	40000 - 80000	Variable based on complexity

Table 3: Summary statistics

Parameter	Value/Range
Total patients	25
Gender (M:F)	18:7
Mean Age (yr)	42,6 +/- 10.2 (range 25 - 60)
Common Etology	Post fasciotomy (n=12, 48%)
Common Location	Lower limb (n=14, 56%)
Mean wound size (sq.cm.)	44.3 +/- 18.5 (range: 15-84)
Mean duration to closure	8.2 +/- 2.1 days
Comorbidities present	12 patients (48%)
Smokers	8 patients(32%)
Non smokers	17 patients (68%)
Complete closure rate	92% (23/25)
Mean healing time	20.3 +/- 3.0 days
Complication rate	0% major, 32% minor transient
Mean cost per patient	<₹50

DISCUSSION

This series demonstrates that cable ties can be repurposed as a safe, effective, and extremely low-cost top closure system. The technique exploits skin's viscoelastic creep and stress relaxation [3,4], allowing gradual wound edge approximation without compromising vascularity. Our findings align with prior low cost innovations such as the shoelace technique [10] and rubber band stretching[11]. In India's resource-constrained public health system, such frugal innovations are essential to provide affordable care without compromising outcomes[7,12,13].

The high success rate (92%) and absence of major complications align with previous smaller reports. The method is simple, teachable, and reduces dependency on expensive devices or grafts, making it suitable for wider dissemination in district hospitals, as emphasized in wound care guidelines[14,15].

Limitations: The study is observational, without a control group, and lacks long-term scar assessment. Randomized trials are recommended.

CONCLUSION

Cable ties offer a practical, economical, and reliable alternative for delayed primary wound closure in resource-limited settings. Their adoption can reduce surgical costs, shorten hospital stays, and improve access to effective wound care.

REFERENCES

1. 1. Argenta LC, Morykwas MJ. Vacuum-assisted closure: a new method for wound control and treatment: clinical experience. Ann Plast Surg. 1997;38(6):563-577.
2. 2. Gibbons GW. Grabb and Smith's Plastic Surgery. 8th ed. Lippincott Williams & Wilkins; 2019: Chapter 12 – Principles of Wound Closure.
3. 3. Kaufman T, Hirshowitz B. The stretched skin: a biomechanical evaluation. Plast Reconstr Surg. 1980;65(3):323-327.
4. 4. Tavakoli M, Zohrabi M. Mechanical creep and stress relaxation in human skin: implications for tissue expansion. J Mech Behav Biomed Mater. 2017;74:373-379.
5. 5. Topaz M, Carmel NN, Silberman A, et al. The TopClosure® 3S System, for skin stretching and a secure wound closure. Eur J Plast Surg. 2012;35:533-543.

ISSN (O): 2687-5365; ISSN (P): 2753-6556

6. 6. Govaert GA, van Helden S. Ty-raps in trauma: a novel closing technique of extremity fasciotomy wounds. J Trauma. 2010;69(4):972-975.
7. 7. Bhattacharya V, Goyal S, Singh S. Low-cost innovations in plastic surgery: the Indian perspective. Indian J Plast Surg. 2018;51(1):4-11.
8. 8. Rai R, Srinivasan S. The Partridge cerclage system revisited: use of nylon straps in orthopedic and plastic surgery. J Clin Orthop Trauma. 2017;8(Suppl 2):S61-S65.
9. 9. Mohan A, Singh R, Soni A. Cost-effective wound closure techniques in trauma surgery: a review from a tertiary care center in North India. J Emerg Trauma Shock. 2021;14(2):98-104.
10. 10. Narayanan RV, Kannan RY, Nair S. The shoelace technique for delayed primary closure of fasciotomy wounds: a prospective study. Indian J Orthop. 2019;53(4):527-532.
11. 11. Patel PB, Ramakrishnan T. Simple skin-stretching using rubber bands for wound closure: a case series. World J Plast Surg. 2020;9(2):195-200.
12. 12. Venkataram A, Venkataram S. Ethical and economic challenges in plastic surgery in developing countries. Indian J Plast Surg. 2019;52(2):133-139.
13. 13. Sharma RK, Parashar A. Local flaps in the era of microsurgery: still relevant in resource-limited setups. Indian J Plast Surg. 2020;53(2):175-182.
14. 14. Sood R, Achauer BM. Burn wound closure using the Versajet™ and skin stretching with external devices. Burns. 2005;31(7):910-915.
15. 15. Zenn MR, Jones G. Reconstructive Surgery: Anatomy, Technique, & Clinical Application. 2nd ed. Thieme; 2020: Chapter 8 – Wound Healing and Closure.

ISSN (O): 2687-5365; ISSN (P): 2753-6556