Mesh, Glue, and Absorbable Monocryl Sutures for Carpal Tunnel Decompression: A Perfect Closure?

Gopalakrishnan Madhavan Sasidharan[1]

[1] Department of Neurosurgery, Jawaharlal Institute of Postgraduate Medical Education and Research, Puducherry, India

J Peripher Nerve Surg 2025;9:47–51.

Address for correspondence Gopalakrishnan Madhavan Sasidharan, MCh, Department of Neurosurgery, Jawaharlal Institute of Postgraduate Medical Education and Research, Puducherry 605008, India (e-mail: gopalakrishnanms@gmail.com).

Abstract

Since surgery for carpal tunnel syndrome is the most commonly performed elective operation on the hand, improvements in outcome by optimizing each of its steps are worth pursuing. Despite multiple randomized controlled trials and meta-analyses, the perfect way to close the incision in open carpal tunnel release remains uncertain. Here, I describe using mesh, cyanoacrylate glue, and absorbable Monocryl sutures in a small patient series to achieve a nonbulky, nearly transparent closure, eliminating follow-up visit requirements. The combination appears superior to the methods usually used for absorbable closure with Vicryl and Vicryl Rapide. This report presents an experiential analysis rather than a formal quantitative evaluation and includes a brief review of the literature on closure techniques and the potential for future research.

Keywords

- absorbable sutures
- carpal tunnel syndrome
- stitch granuloma
- surgical site infection
- tissue glue

Introduction

Open release of the flexor retinaculum is the gold standard surgical procedure for the most commonly diagnosed entrapment neuropathy, and it is estimated to be performed on 1.9% of men and 4.1% of women during their lifetimes.[1] The ideal closure method still needs to be determined despite the availability of randomized controlled trials (RCTs). Dehiscence, inflammation, itching, tenderness, scar formation, and suboptimal hand function are potential complications from closure variations.[2] Here, I present a novel technique using mesh and glue to reinforce a continuous, two-layer, absorbable Monocryl suture. This report is based on observations in a small patient series and does not represent a quantitative evaluation. I also briefly describe the methods to minimize pain.

Patients and Methods

I offered the patients an open flexor retinaculum release if they had clinical signs and symptoms of carpal tunnel syndrome, especially if they had an isolated weakness of the abductor pollicis brevis. Electrodiagnostic negative findings were not a contraindication for surgery. The patients themselves put a 2- to 3-mm-thick coating of lignocaine and prilocaine cream (Prilox, Neon Laboratories, Uttarakhand, India) at least 2 hours before the scheduled surgery around the lifeline of the palm, and they put a plastic dressing on top of it to aid absorption. This application reduced the pain of the needle penetration of the local anesthetic injection.

After wiping off the cream and cleaning the part with a chlorhexidine 4% solution, I injected 2% lignocaine with 1/200,000 adrenaline solution with a 26-gauge needle. To reduce the sting further, 1 mL of 8.4% sodium bicarbonate was added per 10 mL of the solution. Patients continuously rated the pain on a numerical scale of 0 to 10, where 10 was the worst possible pain during the surgery. I aimed to maintain a pain score of less than 3 by injecting very slowly, beginning in the dermal plane and then progressing to the subdermal plane, using about 7 mL of the solution until the

DOI https://doi.org/10.1055/s-0044-1800871.
ISSN XXXX-XXXX.

Thieme Medical and Scientific Publishers Pvt. Ltd., A-12, 2nd Floor, Sector 2, Noida-201301 UP, India

incision area became firm and blanched. After this infiltration, I performed further cleaning and draping so that sufficient time would elapse for the anesthetic agent to act. No tourniquet was necessary.

I performed the microsurgical release under operating microscope magnification and kept the proximal end of the incision distal to the wrist crease to avoid a tender scar. Thinning of the flexor retinaculum with a no. 15 blade allowed the nonforceful sliding of Metzenbaum scissors under it.

Angulating the microscope tangential to the palm and using a small right-angle retractor enabled the cutting of the wrist part of the flexor retinaculum under complete microscopic visual control to avoid any neural injury.

After hemostasis (coagulating a rare dermal bleeder), I closed the incision with continuous running Monocryl (a copolymer of glycolide and ε-caprolactone, Ethicon) in the dermal plane. The suture was looped at one end of the incision, continued superficially, and buried by pulling it under the skin. After mopping dry, I placed an 8×3 cm self-adhesive mesh over the wound, applied a coat of the octyl cyanoacrylate glue over it (Prineo Dermabond, Ethicon) and allowed it to air dry (►**Fig. 1**). Postoperative pain control included round-the-clock paracetamol for 1 to 2 weeks and nonsteroidal anti-inflammatory drugs, such as ketorolac, for the first 5 days. Patients removed the mesh after 2 weeks and were advised to return only if issues arose, although they could follow up at any time.

I gathered observational data from nine consecutive patients based on my clinical experience. This study does not represent a RCT or a statistically significant analysis.

Results

I used the technique on nine consecutive patients. The surgical site was unencumbered with any sort of gauze or bandage dressing, and the incision remained visible under the mesh. The patient could use the hand immediately after surgery and wash it, if they wished, as the mesh and the glue formed a water-impermeable layer. None of these patients developed wound dehiscence, inflammation, wound exudates, or scar tenderness. All the patients came for a routine first follow-up visit ranging from 3 weeks to 2 months on their own, if and when they preferred. All had good relief of pain and no new complaints. In one of the patients, who continued on 75 mg of clopidogrel for ischemic heart disease on the day of surgery, there was a minor ooze through the mesh that required temporary gauze application in the immediate postoperative period. Compared with a previous series using Vicryl and Vicryl Rapide (most with antibacterial-coated Vicryl Plus), this technique showed no wound granulomas or retained suture materials at follow-up, and I observed no wound dehiscence. Earlier patients in whom I used continuous two-layer Monocryl without glue and mesh had occasional wound dehiscence.

Discussion

The closure technique for open carpal tunnel decompression continues to be investigated in terms of its success in reducing pain, inflammation, and hand function. Early RCTs like those of Theopold et al in 2012 found that simple sutures with absorbable 4–0 Vicryl Rapide were as good as

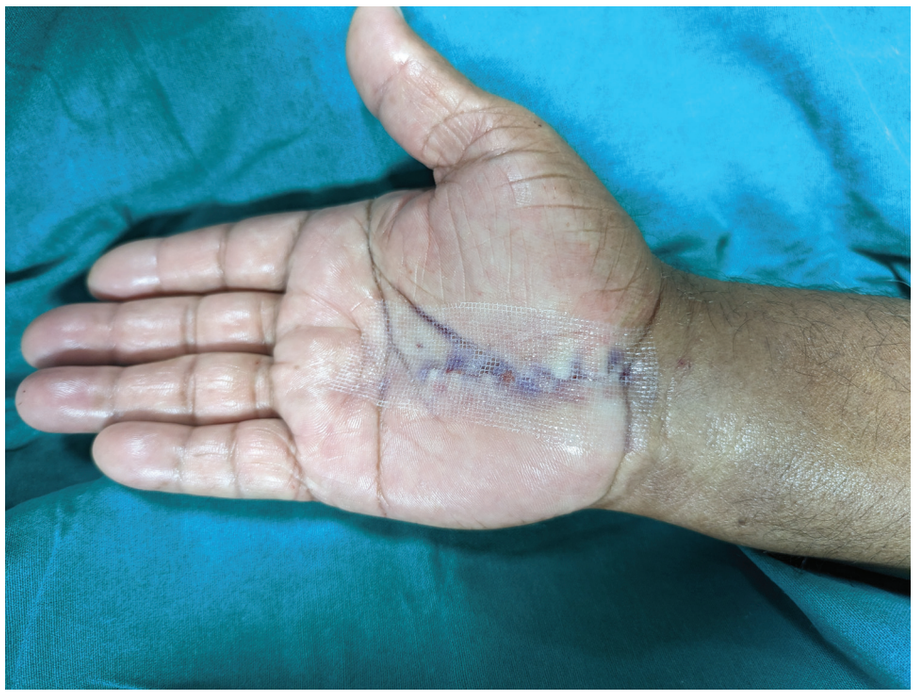

Fig. 1 The immediate postoperative photograph showing the result. The incision is visible through the mesh, and the glue has dried. No further dressing is required.

Novafil 40 (monofilament Polybutester) in terms of the aesthetic outcome as measured with the advantage that the absorbable sutures would just fall off painlessly.[3]

Buried cutaneous absorbable sutures were thought to cause more inflammation—the trials by Erel et al[5] in 2001 and Kharwadkar et al[4] in 2005 did show increased pain and inflammation (the latter being statistically significant) in the Vicryl group at 6 weeks, compared with the patients whose wounds were approximated with simple Prolene sutures.

My experience has been that Vicryl and Vicryl Rapide tend to result in stitch granulomas and tenderness: patients return with complaints, though the original symptoms of carpal tunnel syndrome would have disappeared. Vicryl Rapide (irradiated form of Vicryl) is absorbed in 42 days compared with Vicryl (Polyglactin 910), which gets absorbed in 56 to 70 days. Still, the issue of suture extrusion remains at a superficial location like the palm for Vicryl Rapide. The knot sites at the end of the incision, with more braided suture material for degradation, are particularly prone to this complication. Menovsky et al reported a statistically significant chance of wound granuloma with Vicryl use compared with nylon or stainless steel sutures for skin closure in an RCT involving 61 patients.[6]

Wade et al did a Cochrane meta-analysis of five RCTs involving 255 patients published till 2017. Still, they could not conclude whether absorbable sutures confer better, worse, or equivalent outcomes as the quality of evidence was poor. They recommended more rigorously performed, noninferiority, randomized trials with economic analyses to inform the choice of the suture. Noninferiority trials are important since superiority trials showing no advantage of one intervention over the other cannot be interpreted as equal efficiency.[2] Individual trials, however, showed some benefits in aesthetic and pain outcomes.[3,7] ►**Table 1** shows the main findings of some of the RCTs.

If one uses Monocryl (a copolymer of glycolide and ε-caprolactone) alone, the wound tends to open up because of the inherently stretchable nature of the suture, especially if the patient stretches the hand widely during routine activities. In an earlier series of patients, I attempted to eliminate the problem by using polydioxanone (PDS) in the subdermal layer and Monocryl as the cuticular running layer. Although the wound was free from the risk of dehiscence, there was a much-increased frequency of rigid fibrils of PDS extruding through the wound after many weeks since PDS absorption takes over 6 months. One patient had to be reoperated on to remove these fibrils.

Glue: The New Entrant

An interesting new RCT of almost a hundred patients published in 2024 by Sunjic Roguljic et al. Revealed statistically significant improvements in postoperative hand grip strength, sensory amplitude, velocity, and motor latency in the group where the wound was approximated with subcutaneous 40 antibacterial Vicryl and a two-component acrylate adhesive compared with the group who received transcutaneous nylon stitches when followed up at 6 months.[8] However, there were no statistically significant differences in the improvements in functional outcomes as measured by the Boston Carpal Tunnel Questionnaire. However, one must note that the patients in the glue group had better muscle strength and motor amplitude preoperatively despite the randomization and the authors did not provide a multivariate analysis adjusting for this difference.

The authors hypothesized that the reduced pressure of the glue with subcutaneous sutures on the nociceptors allows the patients to use the operated hand earlier. The same group had reported a year back about the superior cosmetic outcomes and reduced pain when the patients were assessed at 2 and 6 weeks in another RCT.[9]

Glue and Mesh System: Belts on Braces Approach (Dual Reinforcement)

The Prineo Dermabond system (Ethicon), introduced in 2011, is an improvement because the self-adhesive polyester mesh is a strong scaffolding over which the glue (2-octyl cyanoacrylate) polymerizes. Hence, it gives superior tensile strength compared with just the glue alone. As with cyanoacrylate glue, it also provides a mechanical barrier to infection by locking in bacteria within the skin pores and preventing ingress of bacteria for up to 72 hours.[10] An RCT of skin closure in total knee arthroplasty in 105 patients randomized into three groups (2-octyl with mesh, n-butyl-2, and no adhesive) showed that the adhesive material with mesh showed superiority when compared with no skin adhesive or n-butyl-2 in reducing wound discharge, improving the cosmetic outcomes without increasing wound complications.[11] All patients had received barbed continuous sutures in the deep tissue in this study.

Therefore, the glue and mesh system should offer greater protection against dehiscence when using stretchable Monocryl in a dynamic area like the palm, where tissue movement exerts force. This nearly transparent, washable dressing allows immediate hand use postsurgery, preventing finger stiffness. One could even consider omitting the superficial intradermal running layer of Monocryl, further reducing the suture bulk on the skin, though I have yet to use that approach. The simpler monofilament structure of Monocryl reduces the chances of bacterial adhesion compared with the braided complex surface of suture materials like Vicryl. In the latter, the crevices provide more surface for bacteria to adhere and hide.

Eliminating the need to follow up for suture removal or managing complications like wound dehiscence or stitch granuloma could have economic advantages to patients and the health care system. The findings I report here are primarily qualitative and reflect my observations and experiences in a clinical setting. While these outcomes appear promising, further quantitative evaluation in a larger cohort, ideally through a noninferiority RCT with economic analysis, is necessary to confirm these results.

Conclusions

My experiential analysis suggests the potential benefits of the mesh, glue, and Monocryl combination for closing open

Table 1 Major randomized controlled trials where absorbable suturing was compared with nonabsorbable ones

Study	Sample size	Closure techniques compared	Main findings	Effect size (95% CI)
Erel et al[5]	64	Absorbable (Vicryl) vs. nonabsorbable (Ethilon) sutures	No significant differences in scar appearance or patient satisfaction; higher rate of inflammation and tenderness in the Vicryl group	"Significantly more ($p = 0.009$) residual wound inflammation" in the Vicryl group
Menovsky et al[6]	61	Nylon vs. polyglactin 910 (Vicryl) vs. stainless steel sutures	Higher incidence of infections and suture granulomas with Vicryl	The infection rate was 0, 8, and 0% for the nylon, Vicryl, and steel groups, respectively. Suture granulomas were significantly more common in the Vicryl group ($p < 0.05$)
Kharwadkar et al[4]	80	Absorbable (Vicryl) vs. nonabsorbable (Prolene) sutures	Increased pain and inflammation in the Vicryl group at 6 wk	Not reported
Theopold et al[3]	100	Absorbable (Vicryl Rapide) vs. nonabsorbable (Novafil) sutures	Comparable aesthetic outcomes: absorbable sutures associated with less pain	Not reported
Suwannaphisit et al[7]	142	Running subcuticular vs. Donati suture techniques	Lower scar assessment scores at 2 wk with running subcuticular; no differences at 6 and 12 wk	Patient's score of the scar was only significantly lower for running subcuticular sutures (15.3 ± 4.8 vs. 17 ± 4.6, respectively, $p < 0.05$)
Sunjic Roguljic et al[9]	95	Subcutaneous antibacterial Vicryl + glue vs. nylon	Superior cosmetic outcomes and reduced pain at 2 and 6 wk in the glue group	Aesthetic outcome at 2 wk: mean difference $= -0.8$ (95% CI: -1.5 to -0.1). Authors note that there is no clinical significance of a statistically significant small difference in the pain scale
Sunjic Roguljic et al[8]	100	Subcutaneous antibacterial Vicryl + glue vs. nylon	Statistically significant improvements in postoperative hand grip strength, sensory amplitude, velocity, and motor latency in the glue group compared with the nylon group	Exact confidence intervals are not available, but only *p*-values

Abbreviation: CI, confidence interval.

Journal of Peripheral Nerve Surgery Vol. 9 No. 1/2025

carpal tunnel release incisions. However, future quantitative research must validate these findings statistically.

Funding
None.

Conflict of Interest
None declared.

References

1 Pourmemari MH, Heliövaara M, Viikari-Juntura E, Shiri R. Carpal tunnel release: lifetime prevalence, annual incidence, and risk factors. Muscle Nerve 2018;58(04):497–502
2 Wade RG, Wormald JC, Figus A. Absorbable versus non-absorbable sutures for skin closure after carpal tunnel decompression surgery. Cochrane Database Syst Rev 2018;2(02):CD011757
3 Theopold C, Potter S, Dempsey M, O'Shaughnessy M. A randomised controlled trial of absorbable versus non-absorbable sutures for skin closure after open carpal tunnel release. J Hand Surg Eur Vol 2012;37(04):350–353
4 Kharwadkar N, Naique S, Molitor PJA. Prospective randomized trial comparing absorbable and non-absorbable sutures in open carpal tunnel release. J Hand Surg [Br] 2005;30(01): 92–95
5 Erel E, Pleasance PI, Ahmed O, Hart NB. Absorbable versus non-absorbable suture in carpal tunnel decompression. J Hand Surg [Br] 2001;26(02):157–158
6 Menovsky T, Bartels RHMA, van Lindert EL, Grotenhuis JA. Skin closure in carpal tunnel surgery: a prospective comparative study between nylon, polyglactin 910 and stainless steel sutures. Hand Surg 2004;9(01):35–38
7 Suwannaphisit S, Aonsong W, Suwanno P, Yuenyongviwat V. Comparing the running subcuticular technique versus the Donati technique in open carpal tunnel release: a randomized controlled trial. J Orthop Surg Res 2021;16(01):565
8 Sunjic Roguljic V, Roguljic L, Kovacic V, Bilic I, Jukic I. The influence of the tissue adhesive material as a surgical wound-closure technique following carpal tunnel decompression on neurological and functional outcomes: a single-center randomized controlled trial. Cureus 2024;16(01):e53312
9 Sunjic Roguljic V, Roguljic L, Kovacic V, Jukic I. A comparison of tissue adhesive material and suture as wound-closure techniques following carpal tunnel decompression: a single-center randomized control trial. J Clin Med 2023;12(08):2864
10 J&J MedTech. DERMABOND PRINEO Skin Closure System. Accessed November 11, 2024 at: https://www.jnjmedtech.com/en-EMEA/product/dermabond-prineo-skin-closure-system
11 Liu T, Tao Y, Zhao R, et al. Comparison of the safety and efficacy of three superficial skin closure methods for multi-layer wound closure in total knee arthroplasty: a multicenter, prospective, randomized controlled trial. Arthroplasty 2024;6(01):51

