SICOT-J 2026, **12**, 87
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https://doi.org/10.1051/sicotj/2026082

SICOT-J

Available online at:
www.sicot-j.org

SURGICAL TECHNIQUE OPEN ACCESS

Wound closure in knee arthroplasty using barbed sutures and biological glue: Surgical technique and preliminary results

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Received 28 April 2026, Accepted 13 September 2026, Published online 19 November 2026

Abstract – Skin closure after knee arthroplasty, often considered a secondary step, nonetheless plays a crucial role in postoperative recovery and the early initiation of rehabilitation. The optimal closure technique is still a matter of debate. Barbed absorbable sutures may represent a technical advancement by promoting a more even distribution of tension without the need for knots, which may help reduce the risk of wound dehiscence. When combined with a cyanoacrylate-based surgical glue, they may provide a watertight barrier with antimicrobial properties. Together, these features may enhance immediate wound sealing and support early knee mobilization with earlier dressing removal. The aim of this technical note is to present a closure protocol for unicompartmental or total knee arthroplasties and to report preliminary results in 658 patients. *Level of evidence*: IV.

Key words: Knee arthroplasty, wound closure, Scar, Surgical glue, Barbed suture.

Introduction

Skin closure after knee arthroplasty is sometimes viewed as a secondary step, even though it plays a vital role in postoperative outcomes and the early start of rehabilitation [1]. Poor wound healing can compromise postoperative results by increasing the risk of infection, wound dehiscence, and cosmetic sequelae [2]. In the presence of an implant, any impairment in wound healing exposes the patient to a risk of deep infection potentially requiring revision surgery, making the choice of suture technique critical despite its limited consideration in recent publications on evolving knee practices [3].

To date, the optimal technique for skin closure after knee arthroplasty remains debated [2]. The combination of Vicryl suture and skin staples is still commonly used for its simplicity and mechanical strength, but it requires painful removal and may result in poor cosmetic appearance [3]. Several studies also report a slightly increased risk of surgical site infection with staples [4, 5].

Barbed absorbable sutures represent an innovative alternative, providing uniform tension without knots, improving skin approximation, and reducing the risk of wound dehiscence [6, 7]. When combined with a cyanoacrylate-based surgical glue, they may form a watertight, impermeable, and antimicrobial barrier, reducing the need for dressings. However, the literature highlights a lack of strong evidence for the glue's effectiveness in preventing complications and improving healing quality, and there have been reported cases of allergic reactions [2, 8].

This technical note describes the steps for closing an arthrotomy after total or unicompartmental knee replacement via the subvastus approach using barbed absorbable sutures combined with a surgical glue for the skin layer. This technique, not previously described in the literature, is presented with retrospective preliminary results from 658 patients.

Technique (Video 1)

After implantation, the knee is flexed to 90° and a field clamp is used to approximate the edges of the arthrotomy. The arthrotomy is sutured with Stratafix Symmetric PDS Plus 1® (Ethicon), a barbed suture that eliminates the need for a knot proximally due to its tab end and distally because of its barbed design. The "Plus" version, impregnated with triclosan, may also ensure an antibacterial effect [9]. A subcutaneous running suture is then performed with Monocryl 2.0. This is reinforced with an intradermal running suture with Stratafix 3.0 Monocryl Plus®, starting proximally through the preformed loop, which

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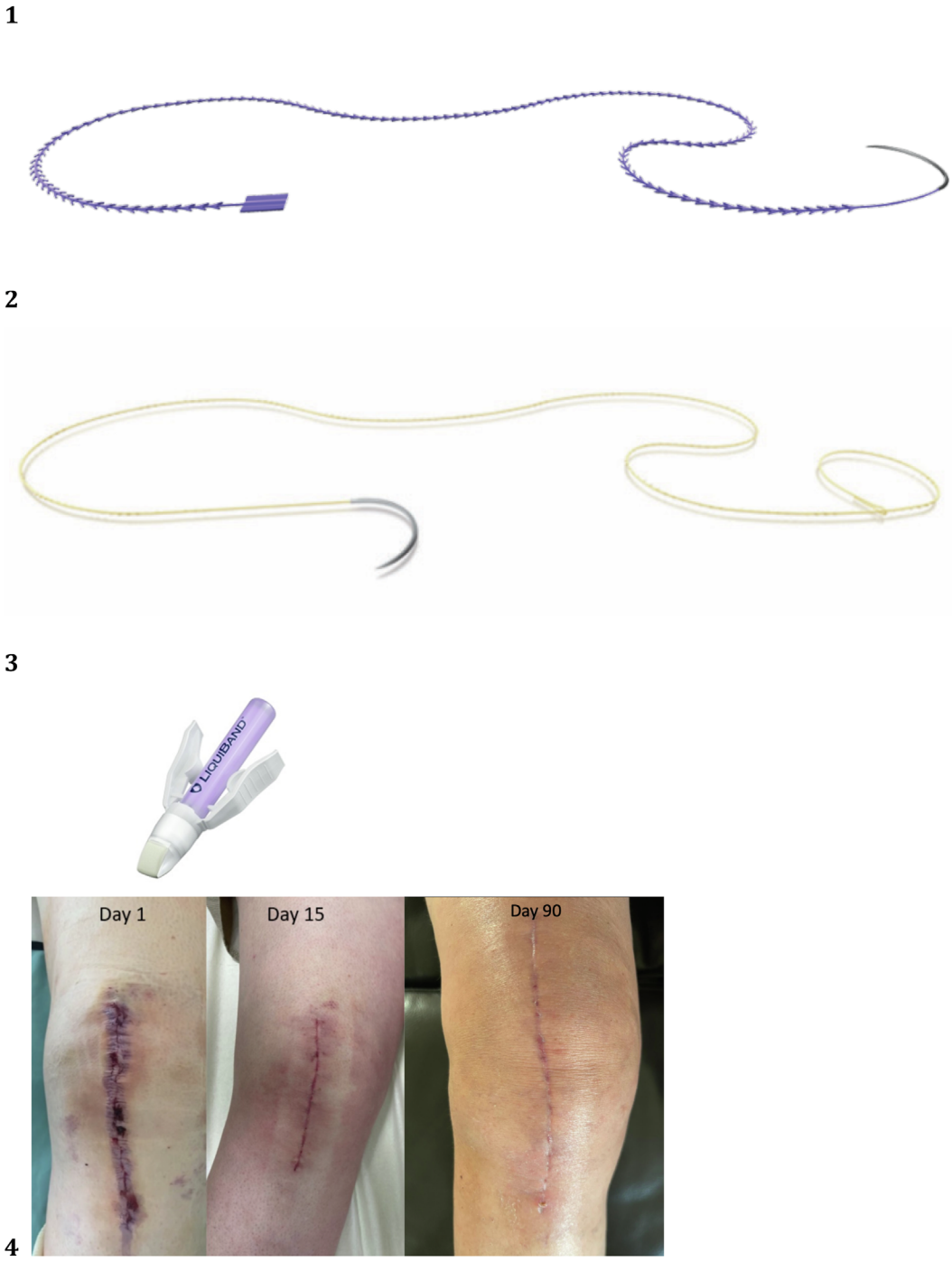


Figure 1. Barbed sutures and biological glue. (1) Arthrotomy closure; (2) subcutaneous tissue closure; and (3) skin adhesive for skin closure; (4) skin evolution dressing D0, D15 and D90.

removes the need for a proximal knot, and no distal knot is needed thanks to the barbed design of the suture. Closure is completed with the application of LiquiBand Exceed® (Advanced Medical Solutions) biological glue along the entire length of the scar (Figure 1). After a drying time of approximately 20 s, a dressing is applied and then removed at hospital discharge. The adhesive subsequently detaches spontaneously during showering, without the need to rub the incision.

Preliminary results

The closure protocol combining barbed suture and biological glue was implemented at the Toulouse University Hospital between June 2023 and November 2025. This retrospective cohort study was performed by a single surgeon on 520 total knee arthroplasties and 138 unicompartmental arthroplasties in 658 patients (305 women, 353 men), with an average age of

68.9 ± 10.3 years and an average BMI of 27.4 ± 4.1 kg/m^2. Patient characteristics are presented in Table 1.

Patients were included if they underwent either total or unicompartmental knee arthroplasty. All patients were seen at a 15-day follow-up visit to assess scar evolution and the check absence of Arthrogenic Muscle Inhibition [10]. Postoperative complications, including AMI were recorded as part of the standard clinical follow-up for all patients and were not considered outcomes directly associated with the wound closure method. Patients were then seen again at 3 months and at 1 year.

We observed five wound-related complications (0.75%, 5/658). Delayed wound healing was defined as the presence of exuberant granulation tissue along the surgical incision in the absence of separation of the wound edges (wound dehiscence). Two patients required Steri-Strips applied 15 days postoperatively because of delayed wound healing without wound dehiscence. Three patients underwent debridement and irrigation with exchange of the mobile polyethylene component for acute periprosthetic joint infection (PJI) [11]. The diagnosis of acute PJI was established according to the 2018 International Consensus Meeting (ICM) criteria and supported by clinical findings (an inflamed knee), elevated serum C-reactive protein levels, and positive intraoperative microbiological cultures. All three patients received targeted postoperative antibiotic therapy for three months based on microbiological susceptibility testing. Methicillin-susceptible *Staphylococcus aureus* was isolated in two patients, and *Staphylococcus epidermidis* was isolated in one patient. All three patients achieved clinical resolution of the infection at the latest follow-up with a painless and stable knee, no joint effusion, and normalization of inflammatory markers, including the absence of elevated C-reactive protein levels.

An allergic reaction was defined as localized peri-incisional skin erythema in the absence of elevated C-reactive protein levels or other signs of infection. No allergic reactions were observed in this cohort.

Table 1. Baseline characteristics of patients.

Variables	*N* = 658
Arthroplasty design *n* (%)	
Total knee arthroplasty	520 (79.0)
Unicompartmental arthroplasty	138 (21.0)
Gender, *n* (%)	
Men	353 (53.6)
Women	305 (46.4)
BMI, *n* (%)	
BMI < 30	482 (73.3)
30 < BMI < 35	150 (22.8)
BMI > 35	26 (3.9)
ASA score, *n* (%)	
Asa 1	116 (17.6)
Asa 2	433 (65.8)
Asa 3	104 (15.8)
Asa 4	5 (0.8)
Smoker status, *n* (%)	
Yes	44 (6.8)
No	644 (93.2)

Discussion

This technical note describes the steps of closure using barbed suture and biological glue after knee arthroplasty implantation. We also report a monocentric retrospective cohort of 658 knee arthroplasties closed with this technique, with a rate of wound healing complications of 0.75% without any wound dehiscence or need for reoperation due to closure failure.

This rate of postoperative infection is lower than what has been reported in the literature in large-scale cohorts [12]. However, given the absence of a control group, no definitive conclusions regarding the impact of this closure technique on infection rates can be drawn. In fact, this low rate is partly explained by strict patient selection to limit postoperative risk as much as possible [13]. No patient was operated on without well-controlled diabetes (HbA1c < 7%) [14], and all obese patients were referred to a specialized medical nutrition team to achieve a BMI <36 on the day of surgery.

This protocol has the advantage of not requiring prolonged dressings or intervention by a home nurse. As previously described, a dressing is applied at the end of the procedure and removed at hospital discharge. This approach may reduce subsequent manipulation of the wound by healthcare providers, potentially limiting the risk of postoperative contamination [15]. Given the efficacy and good tolerance, these results represent an initial step before conducting a comparative study to address the lack of evidence regarding the use of biological glues in the literature [2].

The use of barbed sutures has become increasingly widespread as an alternative to conventional non-barbed sutures, with previous studies suggesting potential benefits, including reduced wound complications, improved cosmetic outcomes, shorter operative times, and possible cost savings [6, 7].

These results pave the way for more in-depth comparative studies, particularly concerning wound healing quality and patient experience compared to Vicryl closure with staples [16]. A medico-economic study is also needed to assess the impact of this technique on healthcare costs and resource utilization. Although this suturing material may initially appear more expensive, these additional costs may be partially offset by a reduction in postoperative nursing visits, particularly because fewer dressing changes may be required. In addition, the low infection rate observed in this cohort may be associated with lower costs related to surgical revision and hospitalization for postoperative infection, although this study was not designed to evaluate cost-effectiveness.

Conclusion

The combination of a resorbable barbed suture and cyanoacrylate-based skin glue was associated with a low rate of early complications in this cohort and may represent a feasible and well-tolerated option for skin closure after knee arthroplasty. These findings should be confirmed by further studies with a higher level of evidence.

Funding

The authors received no special funding related to this study.

Conflicts of interest

Etienne Cavaignac reports consultancy fees for Arthrex, Smith and Nephew.

Thomas Aubert reports consultancy fees from Corin et Johnson & Johnson, not related to this study.

Régis Pailhé reports consultancy fees from Stryker not related to this study.

Other authors declare that they have no conflicts of interest regarding the present study.

Data availability statement

The datasets used and analyzed during the current study are available from the corresponding author on reasonable request.

Author contribution statement

Alexandre Le Guen acquired data and wrote the original draft. Thomas Aubert, Thomas Ripoll and Candice Giono provided clinical advice and critically revised the contents of the manuscript. Régis Pailhé and Alessandro Carrozzo participated in the clinical treatment of the patient and the improvement of this manuscript. Etienne Cavaignac reviewed and gave suggestions to improve this manuscript.

Ethics approval

The institutional review board of CHU Toulouse approved to conduct this study.

Informed consent

All patients were informed that their clinical data could be used for research and publication purposes and provided their informed consent.

Supplementary material

Supplemental Video 1: Surgical closure technique.
Supplementary material of this article is available at https://www.sicot-j.org/10.1051/sicotj/2026082/olm.

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Cite this article as: Le Guen A, Aubert T, Giono C, Ripoll T, Pailhé R, Carrozzo A & Cavaignac E (2026) Wound closure in knee arthroplasty using barbed sutures and biological glue: Surgical technique and preliminary results. SICOT-J **12**, 87. https://doi.org/10.1051/sicotj/2026082.