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Cyanoacrylate glue fixation of continuous infusion catheters: a simple and effective alternative to adhesive dressings

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Dear Editor,

The Italian Society of Anaesthesia, Analgesia, Resuscitation and Intensive Care (SIAARTI), in its recommendations on acute postoperative pain management, advises the use of continuous infusion of local anesthetic when moderate-to-severe pain is expected to last more than 24 hours.[1] The growing need to optimize surgical recovery and minimize opioid use has made regional analgesia techniques essential in many surgical specialties.[2]

In multimodal analgesia, fascial plane blocks – used in both single-shot and continuous modes – play a pivotal role. However, catheter dislodgement during continuous infusion remains a relevant clinical issue, often managed by ward staff. Although specific data on peripheral catheter removal are lacking, studies in the intensive care setting report high rates of accidental tube and catheter removal, ranging from 6% to 88%, depending on the device.[3-5]

In clinical practice, adhesive dressings (ADs) are commonly used for catheter fixation due to their convenience and ease of application, though they may fail to provide an effective seal, loosen with sweating or movement, and hinder visual inspection for kinking. Locking devices exist, but are often bulky and impractical. Based on these limitations, we developed an alternative fixation technique employing cyanoacrylate glue (CG) – routinely used for surgical hemostasis – given its proven biocompatibility, ease of use, and strong adhesive properties. We compared the holding strength of CG with standard AD fixation in a simulated model. The approval of the ethics committee was not necessary due to the phantom-based nature of the experiment.

A soft tissue model was created using 3% agar gelatin (density 1050 kg/m^3, comparable to muscle tissue)[6,7] poured into 12×12 cm boxes to a depth of 2.5 cm, approximating fascial block planes (such as erector spinae plane and serratus anterior plane)[8] and the paravertebral space block.[9] A 20 G, 50 mm Tuohy needle was inserted at a 45° angle, and a curl-tip catheter (Pajunk, Geisingen, Germany) was advanced and verified under ultrasound.

Two simulators were prepared: one using AD for fixation, and the other using CG (Dermabond, 2-octylcyanoacrylate; Ethicon Inc., USA) applied around the catheter exit point and its first centimeters. Traction resistance was tested by attaching incremental weights (5 mL increments of saline-filled syringes) to the proximal catheter fitting and allowing them to drop from a fixed height, simulating sudden patient movement or tension. Catheter displacement was recorded using the depth markers, with any change considered malpositioning.

Both simulators functioned properly. The AD group demonstrated significantly lower resistance than the CG group (Table 1). In the AD group, catheter dislodgement occurred with a 0.15 N force (15 mL load), while the CG group withstood up to 1.96 N (200 mL load) without appreciable movement. Catheter failure in the AD model was abrupt, with complete extraction once detachment began.

This simulation demonstrates that CG provides substantially superior traction resistance compared to AD for continuous infusion catheter fixation. Accidental dislodgement is a frequent yet often overlooked cause of regional analgesia failure and patient discomfort. While the issue is well documented for other ICU catheters, its relevance in continuous regional analgesia has not been adequately addressed.

The enhanced holding force observed with cyanoacrylate suggests that it offers a more reliable fixation. Additionally, cyanoacrylate's bacteriostatic and hemostatic properties could further improve safety at the insertion site.

We acknowledge the limitations of this *in vitro* study: the agar model does not replicate the complexity of skin, fat, or real patient motion, and the applied forces may not exactly match clinical conditions. *In vivo* validation is therefore warranted to confirm these encouraging findings and assess long-term safety.

Table 1. Resistance to dislodgement: comparison between AD and CG groups at varying traction forces.

Applied load (mL)	Applied force (N)	AD group	CG group
5	0.05	No dislodgement	No dislodgement
7.5	0.07	No dislodgement	No dislodgement
10	0.10	No dislodgement	No dislodgement
12.5	0.12	No dislodgement	No dislodgement
15	0.15	Dislodged	No dislodgement
200	1.96	–	No dislodgement

AD, adhesive dressing; CG, cyanoacrylate glue.

In conclusion, cyanoacrylate glue appears to be a simple, rapid, and effective alternative to adhesive fixation, potentially reducing accidental catheter removal and enhancing adherence to multimodal analgesia protocols as recommended by SIAARTI. Future clinical studies could lead to the integration of this method into enhanced recovery pathways in regional anesthesia.

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