

N-hexyl Cyanoacrylate

N-hexyl cyanoacrylate (NHCA) is a fast-polymerizing liquid embolic agent used in endovascular procedures to occlude blood vessels in the treatment of vascular malformations, such as arteriovenous malformations (AVMs) and dural arteriovenous fistulas (dAVFs).

□ Chemical Description

NHCA is a long-chain alkyl derivative of cyanoacrylate, composed of monomers that rapidly polymerize upon contact with ionic fluids (e.g., blood or saline), forming a solid cast within the vessel.

NHCA is part of the **cyanoacrylate family** of adhesives, differing from shorter-chain compounds (e.g., n-butyl cyanoacrylate, NBCA) by its:

- **Slower polymerization speed**
- **Greater flexibility and control during injection**
- **Improved radiopacity when mixed with Lipiodol**

NHCA vs NBCA: Comparative Summary

Cyanoacrylates are fast-polymerizing liquid embolic agents used in endovascular procedures. The two most used types in neurointervention are:

- **NBCA** = N-butyl cyanoacrylate
- **NHCA** = N-hexyl cyanoacrylate

□ Chemical Structure

- **NBCA**: Shorter alkyl chain (4 carbon atoms)
- **NHCA**: Longer alkyl chain (6 carbon atoms)

→ Longer chains polymerize **more slowly**, allowing greater control.

□ Polymerization Speed

- **NBCA**: Very fast polymerization → hard to control
- **NHCA**: Slower polymerization → more time to reach the nidus

→ NHCA is more **forgiving** during injection.

□ Handling Characteristics

- **NBCA**: Higher risk of **catheter entrapment**, requires rapid and decisive injection
- **NHCA**: Easier manipulation, more predictable penetration, especially when diluted 1:4 with

Lipiodol

□ Target Penetration

- **NBCA**: Often used for **proximal feeder** embolization or high-flow AVMs
- **NHCA**: Better suited for **deep intranidal** penetration due to slower flow and better control

□ Risk of Non-target Embolization

- **NBCA**: Higher risk due to abrupt polymerization
- **NHCA**: Lower risk with proper dilution and technique

□ Cost and Availability

- **NBCA**: Widely available, inexpensive
- **NHCA**: Slightly higher cost, less widely available

□ Common Dilution Agent

- Both are typically diluted with **Lipiodol** to modulate polymerization and increase radiopacity

□ Clinical Use Cases

Use Case	NBCA	NHCA
High-flow AVMs	□	△
Deep nidus penetration	△	□
Preoperative devascularization	□	□
Risky anatomy with tortuous feeders	△	□

△ Limitations

- Both are **permanent, non-resorbable**, and carry risk of embolizing healthy tissue
- Require experienced operators
- Neither offers the **plug-and-push** properties of agents like Onyx or PHIL

□ References

- Murias Quintana E, et al. *Use of NHCA...* Cureus. 2025;17(5):e84290.
- Chapot R, et al. *Neurointerventional embolic agents: a technical and practical overview.*

□ Clinical Application

NHCA is used as a **liquid embolic agent** in:

- Intranidal AVM embolization
- Preoperative devascularization
- Arterial feeder occlusion
- Treatment of superficial vascular malformations
- Selected dAVFs

□ Formulation and Delivery

- Commonly diluted with **Lipiodol** (usually 1:3 to 1:4 ratio) to modulate viscosity and radiopacity.
- Requires **coaxial microcatheter systems** and precise control to avoid non-target embolization.
- Compatible with **DMSO-free catheters**, unlike Onyx or PHIL.

□ Advantages

- Deep intranidal penetration possible
- Fast solidification on contact with blood
- No need for DMSO-compatible devices
- Lower cost compared to Onyx

⚠ Limitations and Risks

- Risk of catheter entrapment if not withdrawn promptly
- Permanent and non-resorbable
- Potential for **non-target embolization**
- Rapid polymerization can be difficult to control in tortuous anatomy
- No long-term outcome data for some formulations (e.g., NHCA vs. NBCA)

□ Related Agents

- NBCA (n-butyl cyanoacrylate)
- Onyx (ethylene-vinyl alcohol copolymer)
- PHIL (precipitating hydrophobic injectable liquid)
- Squid (EVOH-based)

Case series

In a retrospective single-center [case series](#) (n=22 patients, 24 procedures) with no [control group](#) or [comparison](#), Murias Quintana et al. from the Hospital Universitario Central de Asturias, [Oviedo](#), Hospital Clínic de [Barcelona](#), Hospital Universitario Marqués de Valdecilla, [Santander](#), Alfried Krupp Krankenhaus, [Essen](#), Hospital Universitario de [Salamanca](#) ¹⁾ aim to describe outcomes after the use of N-hexyl cyanoacrylate (NHCA, “Magic Glue”) for AVM embolization. Despite its stated aim of evaluating “strengths and limitations,” the article offers a one-sided, promotional narrative that lacks critical analysis.

□ Structural and Conceptual Weaknesses

1. Journal-Level Issues: "Cureus Syndrome"

The journal *Cureus* is increasingly known for:

- Minimal [peer review](#)
- Inflated author lists
- A tendency to prioritize upload speed over [scientific rigor](#)

This paper reinforces that [reputation](#), providing more of a procedural diary than a peer-reviewed study. It embodies [editorial complacency](#) and [academic dilution](#).

2. Lowest Tier of Evidence

A retrospective case series offers no comparative insight. There is:

- No [randomization](#)
- No [control group](#)
- No [prospective outcome measures](#)

This is not [hypothesis-testing research](#) — it's purely [observational](#), anecdotal reporting.

□ Methodological Limitations

3. "Success" Is Redefined to Mean Nothing

The paper defines [technical success](#) as "the outcome achieved based on objective." This is circular reasoning and renders the concept of success meaningless.

4. Data Dump of Technical Details

Injection times and catheter models are listed with obsessive detail:

- HeadWay Duo 167 cm in 70.8%
- Magic 1.2F in the rest
- Injection times: 27 seconds to 9 minutes 38 seconds

Yet none of these details translate to improved patient care or clinical insight.

5. Zero Complications ≠ Safety

No [adverse events](#) in 24 procedures cannot be extrapolated as "safe." This [cohort](#) is underpowered to

detect rare but serious complications — a classic false sense of [security](#).

□ Interpretation Bias and Overreach

6. 12.5% Success = "Effective"?

Only '3 out of 24 cases (12.5%)' achieved complete occlusion with a single NHCA injection. The authors still call it “effective.” This is an example of:

- ::unjustified enthusiasm::
- ::intellectual dishonesty::

7. Promotional Tone

Frequent use of the term “Magic Glue” and positive adjectives for NHCA give this paper the tone of a product brochure, not a neutral scientific analysis.

□ What's Missing?

Key omissions include:

- No clinical or imaging follow-up data
- No outcome measures beyond technical success
- No comparison with other embolic agents (Onyx, PHIL, Squid)
- No cost-benefit analysis
- No discussion of failure cases or limitations in complex AVMs

□ Conclusion

This paper does not meet the standards of a rigorous scientific study. It provides:

- No high-quality evidence
- No clinically useful guidance
- No long-term data

It reinforces the perception of *Cureus* as a platform for uploading technically correct but scientifically irrelevant work. A procedural note disguised as research, this article is a missed opportunity to meaningfully contribute to the field of neurointerventional radiology.

Final Verdict: This is not a “[study](#)” — it is a [technical anecdote](#) polished with promotional language and framed in a journal that too often rewards upload volume over scientific substance.

References

1)

Murias Quintana E, Rodríguez Castro J, Puig J, Gil García A, Chapot R, Maestro V, Llibre JC, Gutiérrez Morales JC, García Arias F, Vega P. Use of [N-hexyl Cyanoacrylate Monomers](#) for the [Treatment](#) of Intra- and Extracranial [Arteriovenous Malformations](#): A Single-Center Experience. Cureus. 2025 May 17;17(5):e84290. doi: 10.7759/cureus.84290. PMID: 40525034; PMCID: PMC12169607.

From:

<https://neurosurgerywiki.com/wiki/> - **Neurosurgery Wiki**

Permanent link:

https://neurosurgerywiki.com/wiki/doku.php?id=n-hexyl_cyanoacrylate

Last update: **2025/06/18 08:56**

