Overcoming Clopidogrel Resistance in Carotid Artery Stenting

Summary of a Full-Length Article | Clinical Practice 2026;16:38 | Vigláš P, Raupach J, Hejčl A, et al.

Why this paper matters to Haemoview

This retrospective, single-centre study addresses a practical issue in carotid artery stenting (CAS): dual antiplatelet therapy is used to reduce thromboembolic complications, but response to clopidogrel varies and high on-treatment platelet reactivity can persist despite standard therapy. The authors analysed platelet function testing in consecutive CAS patients from 2015 to 2024 and evaluated whether changing clopidogrel-resistant patients to ticagrelor or ticlopidine reduced platelet reactivity.

Study at a glance

Item	Detail
Article type	Peer-reviewed retrospective, single-centre observational study of platelet reactivity in consecutive patients undergoing carotid artery stenting.
Authors	Pavol Vigláš, Jan Raupach, Aleš Hejčl, David Černík, Pavla Bradáčová, Patrik Matras and Filip Cihlář.
Journal	Clinical Practice 2026;16:38. DOI: 10.3390/clinpract16020038.
Clinical scope	Carotid artery stenting for carotid stenosis in a single institutional cohort from 2015 to 2024; platelet function testing before stenting under standard dual antiplatelet therapy with aspirin and clopidogrel.
Core finding	High on-treatment platelet reactivity (HTPR) to clopidogrel was observed in 68 of 216 patients (31.4%). Switching to ticagrelor or ticlopidine significantly reduced platelet reactivity, with no HTPR to either alternative agent observed.
Testing link	Platelet function testing was performed using light transmission aggregometry or Multiplate®; testing was used to identify HTPR and to assess response after P2Y12 therapy was changed.

The clinical gap this paper closes

The article explains that CAS is an established treatment option for carotid artery stenosis, but thromboembolic events are observed more often following endovascular treatment. DAPT therefore plays a crucial role. Because clopidogrel effectiveness is affected by interindividual variability, genetic polymorphism, medication interactions and comorbidities, patients may have HTPR despite treatment. The authors note that routine platelet function testing before neurovascular stent implantation remains debated and is not standard in most centres, with limited evidence focused exclusively on extracranial CAS.

Key message: In this 216-patient CAS cohort, HTPR to clopidogrel was common (31.4%). Switching to ticagrelor or ticlopidine significantly reduced platelet reactivity, with no HTPR to either alternative agent observed.

Key findings in detail

Finding	Article detail
1 | Cohort and testing approach	The final study cohort included 216 patients after exclusions. Patients had standard DAPT with aspirin 100 mg and clopidogrel 75 mg before platelet function testing. Testing was performed using light transmission aggregometry or Multiplate®.
2 | Clopidogrel HTPR was common	HTPR to clopidogrel was found in 68 of 216 patients (31.4%). HTPR to acetyl-salicylic acid was found in 56 patients (25.4%), and 29 patients (13.1%) were resistant to both aspirin and clopidogrel.
3 | Ticagrelor reduced platelet reactivity	Among patients with clopidogrel HTPR, P2Y12 therapy was changed to ticagrelor 45 times (66.2%). Platelet reactivity fell significantly by both LTA and Multiplate testing ($p < 0.001$), and no HTPR to ticagrelor was observed.
4 | Ticlopidine also reduced platelet reactivity	P2Y12 therapy was changed to ticlopidine 23 times (33.8%). Platelet reactivity was significantly reduced by both testing methods ($p < 0.001$), and no HTPR to ticlopidine was observed. The article states that ticlopidine is no longer preferred because of safety concerns and limited contemporary use.
5 | Overall interpretation	All 68 patients with HTPR to clopidogrel responded to the antiplatelet therapy change. The authors describe ticagrelor as a viable alternative to overcome clopidogrel HTPR in patients undergoing carotid artery stenting.

Important limitations for clinical interpretation

- Retrospective, descriptive study design; no multivariable regression analysis was performed, so associations should not be interpreted as causal.
- Cut-off values and platelet function test methods lack full standardization between laboratories.
- A single clopidogrel test may not exclude intraindividual variability in response.
- Correlation between light transmission aggregometry and newer methods such as Multiplate® and VerifyNow® remains problematic.
- Aspirin testing was used for comprehensive platelet assessment and contextual interpretation, not to define directly actionable aspirin resistance.

Multiplate platelet aggregation testing is specifically mentioned

The article states that platelet function testing was conducted by light transmission aggregometry and Multiplate. It describes the Multiplate analyzer as determining platelet aggregation through impedance alteration measurements, and reports Multiplate testing in 37.3% (n = 82).

Relevance to platelet function testing users

This article is relevant to platelet function testing discussions because the study used platelet function results before carotid stenting and after antiplatelet therapy changes in patients with HTPR to clopidogrel. The article does not present testing as a universally standardized protocol; it highlights both the potential value of testing and the need for prospective validation.

Paper finding	Relevance to users
HTPR to clopidogrel occurred in 31.4% of patients	Supports discussion of why platelet response may need to be checked rather than assumed under standard aspirin/clopidogrel DAPT.
LTA and Multiplate® were used	Shows two platelet function testing approaches used in the study, while also highlighting the article's concern about inter-method standardization.
Testing identified patients for P2Y12 therapy change	The study pathway used platelet function results to select clopidogrel HTPR patients for ticagrelor or ticlopidine.
Ticagrelor showed no observed HTPR	The authors describe ticagrelor as a viable contemporary alternative after clopidogrel HTPR was identified.
Ticlopidine was effective but is no longer preferred	The article records effective platelet inhibition, while noting discontinuation and safety concerns in contemporary practice.
Prospective multicentre studies are warranted	The authors frame the findings as supportive but not definitive, with standardized testing protocols still needed.

Suggested conversation points

- Dual antiplatelet therapy is central to thromboembolic risk reduction after carotid artery stenting.
- Clopidogrel response was variable: HTPR to clopidogrel was observed in 68 of 216 patients.
- Platelet function testing was used to identify clopidogrel HTPR and to assess response after switching P2Y12 therapy.
- Ticagrelor and ticlopidine both significantly reduced platelet reactivity; no HTPR to either agent was observed in this cohort.
- The article calls for prospective, multicentre studies and standardized platelet function testing protocols.

Sources
Vigláš P, Raupach J, Hejčl A, Černík D, Bradáčová P, Matras P, Cihlář F. Overcoming Clopidogrel Resistance in Carotid Artery Stenting: Experience with Ticagrelor and Ticlopidine. *Clinical Practice*. 2026;16:38. DOI: 10.3390/clinpract16020038.

Visual Summary - Infographic