

Association of enlarged perivascular spaces and anticoagulant-related intracranial hemorrhage

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on behalf of the Clinical Relevance of Microbleeds in Stroke (CROMIS-2) collaborators

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Study question

Are enlarged perivascular spaces (EPVS) within the basal ganglia (BGPVS) or the centrum semiovale (CSOPVS) associated with intracranial hemorrhage (ICH) in patients taking oral anticoagulants (OAC)?

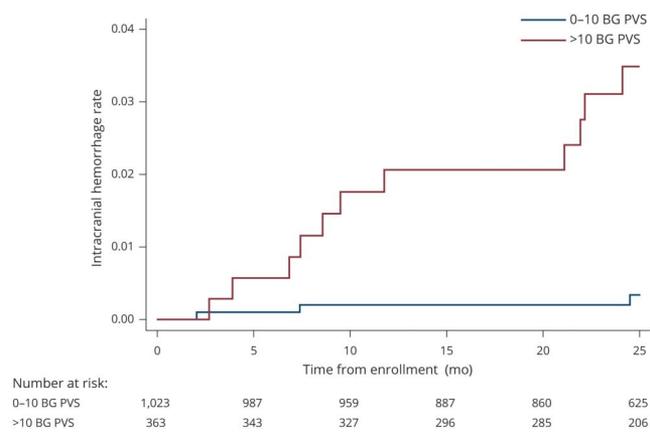
What is known and what this paper adds

Cross-sectional studies suggest that BGPVS might be markers of deep perforator arteriopathy and CSOPVS of amyloid-beta pathology, including CAA, and thus EPVS may be associated with a high risk of ICH. This investigation found an association between BGPVS (but not CSOPVS) and ICH in patients taking OAC.

Methods

This study is a post hoc analysis of data from 1,386 adults (41.5% female; mean age, 75.8 ± 10.4 years) with atrial fibrillation who initiated OAC therapy after ischemic stroke or TIA and were enrolled in the CROMIS-2 (AF) study. MR imaging was performed at baseline according to a standardized protocol, including axial T1-, T2-, diffusion-, and T2*-weighted and FLAIR sequences. Raters blinded to outcomes reviewed baseline MRI scans to tally BGPVS and CSOPVS using a five-level scale which assigns a score of 0 to no visible perivascular spaces, 1 to 1–10, 2 to 11–20, 3 to >21–40, and 4 to >40 perivascular spaces. Scans were also rated for other cerebral small vessel disease markers according to STRIVE definitions, including lacunes, cerebral microbleeds, and white matter hyperintensities, and for atrophy. Participants were followed for 24 months using multiple overlapping methods. The primary outcome was symptomatic intracranial hemorrhage (sICH). Cox regression analysis was used to identify predictors of sICH.

Figure Cumulative incidence plot for sICH in participants with BGPVS counts ≤ 10 (blue) or > 10 (red)



Results and study limitations

Over 3,251 person-years of follow-up, 14 participants developed sICH. In a multivariable model incorporating all variables associated with sICH in univariable analysis, the predictors of sICH were diabetes (hazard ratio [HR], 3.91; 95% confidence interval [CI], 1.34–11.4; $p = 0.012$) and BGPVS counts > 10 (HR, 8.96; 95% CI, 2.41–33.4; $p = 0.001$). CSOPVS counts were not prognostically informative. The present study's limitations include the small number of outcome events and the post hoc nature of the analyses.

Study funding and competing interests

This study was funded by the Stroke Association and the British Heart Foundation. Some authors report additional competing interests. Go to Neurology.org/N for full disclosures.

A draft of the short-form article was written by M. Dalefield, a writer with Editage, a division of Cactus Communications. The corresponding author(s) of the full-length article and the journal editors edited and approved the final version.

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