

SEPTINTOJI TARPTAUTINĖ KONFERENCIJA

THE 7th INTERNATIONAL CONFERENCE

2026 m. liepos mėn. 7-10 d., Vilniaus universitetas, LIETUVA

7th-10th of July, 2026, Vilnius University, LITHUANIA

**EVOLIUCINĖ MEDICINA:
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Rengėjas:

Vilniaus universiteto Medicinos ir sveikatos mokslų
Doktorantūros mokykla, VU Medicinos fakultetas

Organized by

the Doctoral School of Medicine and Health sciences
at Vilnius University, VU Faculty of Medicine

ANATOMICAL VARIABILITY AND MORPHOMETRIC CHARACTERISTICS OF THE HUMAN OPHTHALMIC ARTERY: A SYSTEMATIC LITERATURE REVIEW

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Background and Aim: Recently, there has been growing interest in the variations of various blood vessels, among which the ophthalmic artery (OA) has been relatively little studied due to its complex topography and course. The aim of this study was to systematically synthesise anatomical and morphometric evidence reported in human ophthalmic artery studies.

Materials and Methods: A systematic literature review was conducted according to PRISMA recommendations using PubMed, ScienceDirect, Scopus, and WoS databases. A total of 2880 records were identified, 30 human studies reporting original anatomical, radiologic, angiographic, microsurgical, or endoscopic OA data were included.

Results: Cadaveric or microsurgical methods were used in 26 out of 30 studies (26/30), while 5 also used radiologic imaging, 5 incorporated endoscopic anatomical evaluation, and 3 combined anatomical dissection with imaging or angiography. Beginning of the artery-related findings were reported in all studies (predominantly from internal carotid artery). Anatomical variants included OA arising from the middle meningeal artery, anterior cerebral artery, and persistent embryological configurations (persistent primitive ophthalmic artery) variants. The intracranial and/or intraorbital course of the ophthalmic artery was described in 29/30 included studies (96.7%). The relationship with the optic nerve was evaluated in 23/30 studies (76.6%). Superior crossing patterns were reported more frequently than inferior crossing (57-85% of cases). Branching sequence was analysed in 23/30 studies (76.6%). The central retinal and posterior ciliary arteries were among the most commonly reported early branches, although first-branch patterns varied substantially. Morphometric parameters were reported in 14/30 studies (46.7%). Adult CTA studies reported luminal diameters of approximately 1.35-1.38 mm. Anastomotic connections, especially involving the middle meningeal and lacrimal or recurrent meningeal pathways were described in 13/30 studies (43.3%).

Conclusions: The human OA demonstrates substantial anatomical variability regarding its origin, branching sequence, morphometry, and relationships with the optic nerve. This knowledge is particularly important when performing microsurgical, radiological and endovascular procedures.

Keywords: anatomy, internal carotid artery, morphometry, ophthalmic artery, optic nerve