Understanding the link between PICC and myopic complications

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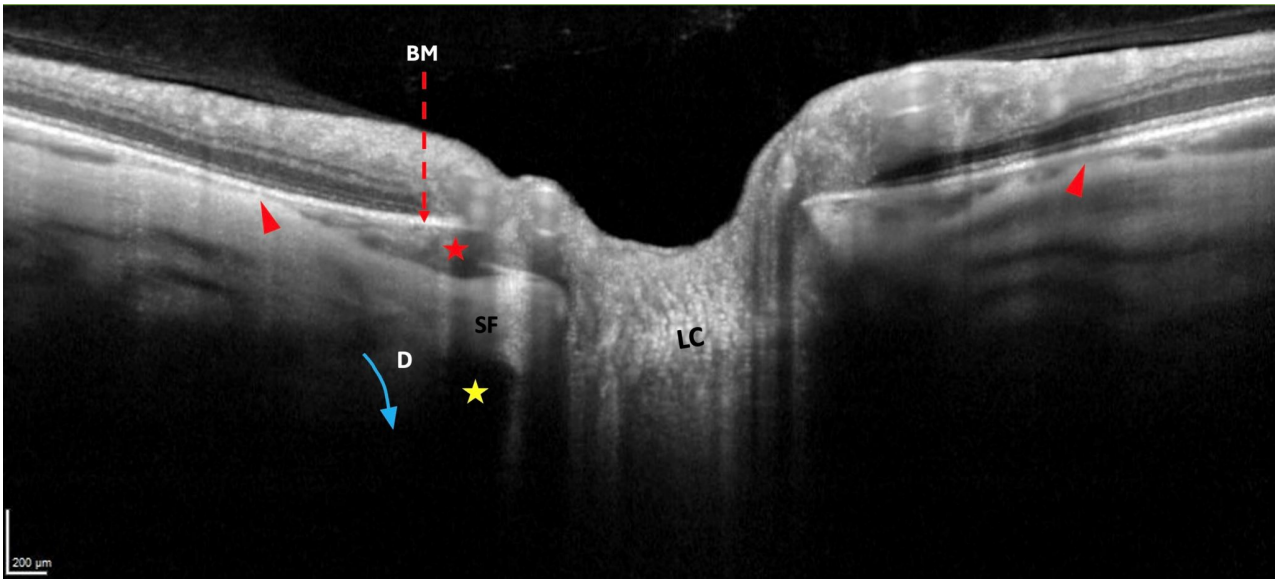

Figure 1. Landmarks of the peripapillary intrachoroidal cavitation (PICC). LC = lamina cribrosa. BM = Bruch's membrane (dashed red arrow). SF = scleral flange, the sclera between the dura and the pia mater. D = dura mater. PICC (red star) is in front of the subarachnoid space (yellow star). It is a suprachoroidal detachment. It is suggested to be promoted by a direct traction force (blue arrow) of the dura mater during eye movements. A tangential component of this traction force squeezes the choroid at the end of the posterior outpouching (red arrowheads). The device used is the Spectral Domain OCT Spectralis® HRA-OCT, model S3300 (Heidelberg Engineering GmbH, Heidelberg Germany). Note: Reprinted from Peripapillary Intrachoroidal Cavitation. Adèle Ehongo et al. 'J. Clin. Med. 2023, 12, 4712' Originally published by and used with permission from MDPI.

Dr Adèle Ehongo discusses the pathogenesis of peripapillary intra-choroidal cavitation and its implications for myopic complications

The complex relationship between myopia and glaucoma is more relevant than ever, as forecasts show an increase in the prevalence of both entities. [1,2]

A tangle that challenges the clinician

Myopic complications not only resemble glaucoma but increase the risk of developing it. They also complicate the diagnosis of glaucoma and influence its progression, which represents a challenge for the clinician in several respects.

Interestingly, a simple way to diagnose one of these myopic complications – Peripapillary Intra-Choroidal Cavitation (PICC) – has recently been highlighted. [3,4] PICC has also been revealed to be a suprachoroidal detachment, while the mechanisms leading to this choroidal cleavage have been postulated to be related to eye movements. [3,4]

The importance of the optic nerve sheath's forces

During eye movements, in some cases optic nerve sheaths (ONS) can create significant traction forces (5) that cause intermittent deformations in the eyewall due to their attachment to the sclera. [6-9] Over time, these repetitive deformations become fixed through tissue remodeling. [3,4,7]

Myopic eyes are more likely to develop PICC

In addition to many pathogenetic hypotheses already put forward, [4] it has recently been suggested that the thinned and softened myopic eyewall makes it more susceptible to the aforementioned traction forces and would facilitate the appearance of the PICC according to the following sequence. [3,4] The traction exerted on the wall of the globe by ONS deforms the sclera outwards. Being very resistant, [10] Bruch's membrane maintains its position. The choroid located between the sclera and Bruch's membrane, and tightly bound to Bruch's membrane, thickens passively and eventually detaches from the sclera: the PICC appears [3,4] (figure 1).

PICC as a clue to understanding other myopic complications

The concept that tractions on the eyewall would promote external deformations of the eyewall has also been suggested for peripapillary staphyloma [3,4] – a localized protrusion of the eyewall around the optic nerve head – (figure 2). The magnitude of these forces reaches that of the extraocular muscles, [9] thus positioning them as potential promoters of other posterior staphylomas. [11] Since staphyloma is a vision-threatening myopic complication, including visual field defects, this concept is relevant and warrants further investigation.

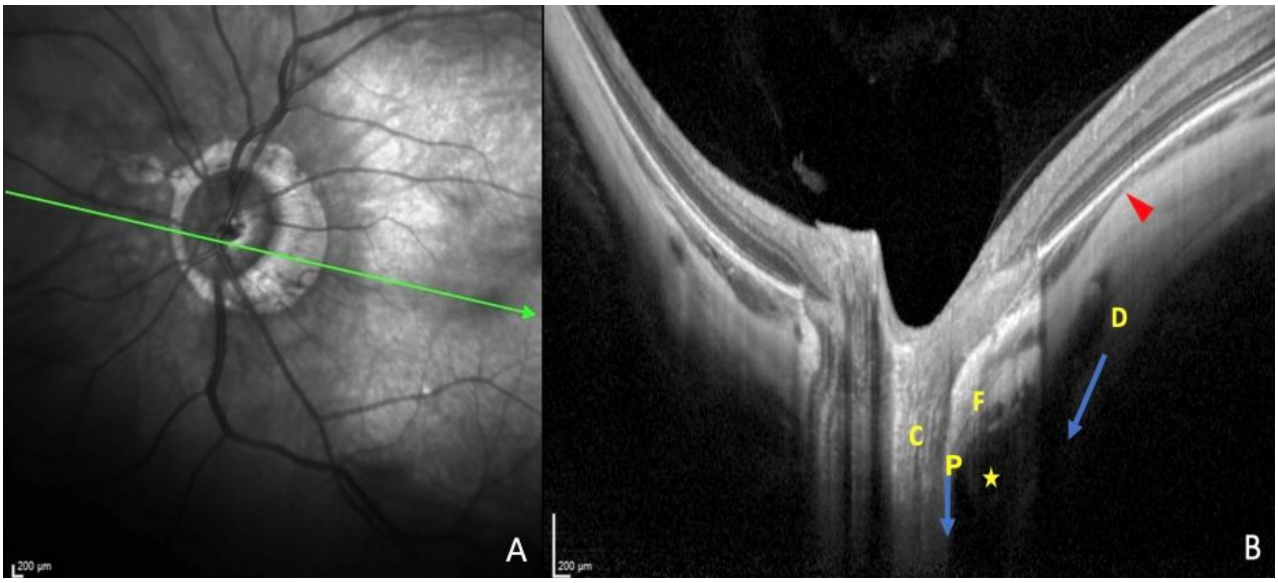

Figure 2. Pathogenetic hypothesis of peripapillary staphyloma (PPS). (A) The green arrow in the infrared image indicates the location of the OCT section. (B) The PPS is characterized by a gradual thinning of the choroid from the periphery towards the PPS edge (red arrowhead) and a gradual re-thickening of the choroid from the PPS edge towards the optic nerve and along an outwards scleral deformation. The direct posterior traction (blue arrows) exerted by the scleral insertions of the optic nerve sheaths would lead to the outpouching of the sclera while the thinning of the choroid at the PPS edge would result from the squeezing of the eyeball by the tangential component (red arrowhead) of this traction force. Abbreviation: D= dura; P = pia mater; F = Scleral flange; C = Lamina cribrosa; Yellow star = Subarachnoid space. The device used is the Spectral Domain OCT Spectralis® HRA-OCT, model S3300 (Heidelberg Engineering GmbH, Heidelberg Germany). Note: Reprinted from Understanding Posterior Staphyloma in Pathologic Myopia: Current Overview, New Input, and Perspectives. Adèle Ehongo. 'Clinical Ophthalmology Clin 2023: 17:3825-3853' Originally published by and used with permission from Dove Medical Press Ltd.

PICC and visual field defects

Visual field defects are found in up to 73.3% of PICC. [12] The relationship between PICC and these defects and how to distinguish such defects from those related to glaucoma will be presented in a future edition.

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