External Elastic Lamina (EEL) Breaks in Femoropopliteal Artery

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Introduction: Elastic fibers are significant components of the arterial wall and are crucial for maintaining the compliance and resilience of blood vessels. These fibers are thought to be only produced before puberty, and their production is ceased beyond adolescence. In the femoropopliteal artery (FPA), the main artery of the leg, these fibers are found primarily in the external elastic lamina (EEL) and are oriented longitudinally. Our research team has observed long breaks in the EEL, which were often found to be filled with thin elastic fibers. In this project, we aimed to examine these breaks in detail and determine whether the fibers filling the break have the characteristics of new elastic fibers. **Methods**: In this preliminary study, we obtained paraffin-embedded blocks from longitudinal sections of 5 human FPA specimens (41±18 years). The blocks were sectioned with a microtome and stained with Verhoeff-Van Gieson (VVG), Movat's Pentachrome, Hematoxylin and eosin (H&E), and Periodic acid–Schiff (PAS). Multiphoton microscopy was employed to verify the presence of elastin cores in the thin fibers and quantify the 3D structure of the elastic fibers. First, using the VVG and Movat stains, we determined whether the breaks had thin fibers filling the gap. Then we further assessed the breaks with H&E and PAS to determine the morphology of cells and microfibrillar components around the elastic fibers. **Results**: In younger samples, most of the thin fibers filling the EEL breaks reacted positively to PAS and were autofluorescent in younger samples. These results indices that the thin fibers have an elastin core and are surrounded by a high density of microfibrillar structures. **Discussion**: These results suggest that the thin fibers filling the EEL break in human FPA samples have the characteristics of newly synthesized elastic fibers. However, to better understand these breaks, similar experiments need to be performed on a large sample size with a more comprehensive histology and immunohistochemistry analysis.