



## Pathology Biology Section – 2007

### G21 Papillomacular Folds: Whiplash Maculopathy or Postmortem Artifact?

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After attending this presentation, attendees will understand the usefulness of postmortem monocular indirect ophthalmoscopy in differentiating postmortem fundal artifacts from pathologically significant retinal folds.

This presentation will impact the forensic community and/or humanity by demonstrating that horizontal, hypopigmented, non-hemorrhagic retinal folds represent a postmortem artifact and must not be misinterpreted as retinal injury from putative vitreoretinal traction associated with whiplash or presumed shaking (Shaken Baby Syndrome or Inflicted Childhood Neurotrauma).

Clinically, whiplash maculopathy has been associated with three subtle macular disturbances following head/neck trauma from hyperextension/flexion. These include mild reduction of central visual acuity or paracentral scotoma, grayish swelling of the foveal zone and a small pit or depression in the fovea. The retinal opacity usually resolves and visual acuity most often returns to 20/20 but the foveal depression invariably remains. No specific pathophysiologic mechanism has explained the development of traumatic retinopathy after this indirect ocular trauma. Some authors favor a mixed mechanism, mechanic and vascular, to explain these alterations while others postulate that local microcirculatory disturbances are the cause of the retinopathy as opposed to the systemic disturbance associated with Purtscher's retinopathy.

A recent publication claimed the first account of the macroscopic and microscopic pathologic findings that they believed were the result of whiplash maculopathy and retinopathy (*Forensic Sci Med Pathol* 2005;1:19-25). The macular and retinal findings were found at autopsy in 20-year-old woman who suffered fatal head and neck injuries following a roller-coaster accident. Both eyes had horizontal folds extending temporally from the optic disc just beyond the fovea presumably secondary to vitreous traction.

However, the horizontal hypopigmented, non-hemorrhagic papillomacular retinal folds depicted in this case report represent postmortem artifacts readily apparent by postmortem monocular indirect ophthalmoscopy as evidenced by the following case. A 4-month-old infant presented to the Emergency Department of a regional medical center apneic and pulseless. Resuscitative efforts re-established cardiac activity but mechanical ventilation was required. Direct and indirect ophthalmoscopy in the Pediatric Intensive Care unit did not reveal any fundal hemorrhages or retinal folds. Death occurred 56 hours after admission. Postmortem monocular indirect ophthalmoscopy performed four hours after death confirmed clinical fundoscopic findings; however, the following morning, 21 hours after death bilateral hypopigmented, non-hemorrhagic retinal papillomacular folds had formed that were grossly and microscopically similar to the retinal folds attributed to whiplash maculopathy.

Subsequent examination of infants and adults who have died from natural disease processes has demonstrated that these artifactual papillomacular retinal folds initially form a few hours after death as retinal elevations around the fovea centralis then extend nasally and temporally. This fairly uniform sequence has been as demonstrated by serial postmortem fundal imaging utilizing monocular indirect ophthalmoscopy. It is imperative that this postmortem artifact is not misinterpreted as retinal injury from putative vitreoretinal traction associated with whiplash or presumed shaking (Shaken Baby Syndrome or Inflicted Childhood Neurotrauma).

**Whiplash Maculopathy, Postmortem Monocular Indirect Ophthalmoscopy, Postmortem Artifact**