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Subretinal Fluid

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Synonyms

Neurosensory retinal detachment; Serous detachment of the sensory retina; Subretinal exudation

Definition

Subretinal fluid corresponds to the accumulation of a clear or lipid-rich exudate (serous fluid) in the subretinal space, i.e., between the neurosensory retina (NSR) and the underlying retinal pigment epithelium (RPE), in the absence of retinal breaks, tears, or traction (Kanski et al. 2011). It represents a breakdown of the normal anatomical arrangement of the retina and its supporting tissues, i.e., the RPE, Bruch's membrane, and the choroid.

Etiology and Classification

Changes in choroidal flow, poor scleral outflow, breakdown of the RPE, and leakage/breakdown of normal or abnormal retinal vessels are the pathophysiological mechanisms that are isolated or in combination associated with subretinal fluid accumulation (Wolfensberger and Tufail 2000). There are some defining features, however, that are common to all cases of subretinal fluid: (1) serous fluid accumulation between the NSR and the RPE in the absence of a rhegmatogenous or tractional component; (2) a characteristic shifting of this fluid with postural changes; (3) a smooth, dome-shaped appearance of the detached retina lacking corrugations or fixed folds; and (4) the presence of associated local (ocular) or systemic conditions (Yanoff and Duker 2014). Identifying a precise etiology can be challenging since the causes of subretinal fluid accumulation are broad and heterogeneous, encompassing several ocular and systemic pathologies. For matters of systematization, an etiologic-based classification is portrayed here:

1. *Inflammatory and autoimmune diseases*: posterior scleritis, systemic lupus erythematosus, Wegener's granulomatosis, polyarteritis nodosa, relapsing polychondritis, dermatomyositis, Goodpasture's disease, rheumatoid arthritis, sarcoidosis, sympathetic ophthalmia, Vogt-Koyanagi-Harada disease, inflammatory bowel disease, pancreatitis
2. *Infectious diseases*: syphilis, toxoplasmosis, tuberculosis, Lyme disease, cat-scratch disease, cytomegalovirus infection, histoplasmosis, coccidiomycosis, cryptococcus, HIV infection

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3. *Neoplastic disorders*: choroidal melanomas and nevi, retinal or choroidal hemangiomas, metastatic choroidal lesions, retinoblastoma, leukemia, multiple myeloma
4. *Vascular diseases*: diabetic retinopathy, retinal vein occlusions, retinal macroaneurysms, hypertensive retinopathy, disseminated intravascular coagulation, thrombotic thrombocytopenic purpura, renal failure, eclampsia/preeclampsia
5. *Congenital abnormalities*: coat's disease, familial exudative vitreoretinopathy, retinal angiomatosis, optic pit, optic disk and/or retinal colobomas, morning glory syndrome, nanophthalmos
6. *Miscellaneous*: central serous chorioretinopathy, pathologic posterior vitreous detachment producing vitreomacular traction, epiretinal membrane, exudative age-related macular degeneration (AMD) (including neovascular phenotypes of AMD such as polypoid choroidal vasculopathy or retinal angiomatous proliferation), uveal effusion syndrome, iatrogenic (interferon or ribavirin treatment-related, among other dugs), bilateral diffuse uveal melanocytic proliferation (BDUMP)

Occurrence and Diagnosis

Unless precluded by hazy ocular media, the presence of subretinal fluid can generally be established during a thorough clinical examination using indirect ophthalmoscopy (Kanski et al. 2011). Even though the location, extent, and area occupied by the subretinal fluid can vary according to the etiology, the NSR detachment characteristically assumes a convex, dome-shaped configuration with a smooth, fold-free surface. Shifting of fluid to dependent positions with postural changes is a distinctive finding that should be sought during examination. Although the condition may be asymptomatic, decreased visual acuity can be manifest at presentation whenever the fluid accumulates under the macular area (e.g., central serous chorioretinopathy). Metamorphopsia, reduced color vision, and reduced contrast sensitivity are also commonly reported symptoms. The advent of leopard spots, consisting of scattered areas of subretinal clumping, may be seen after a prolonged NSR detachment has flattened (Yanoff and Duker 2014).

Subretinal fluid can be uni- or bilateral and may be observed as an isolate finding or occur in combination with other ocular findings such as lipidic exudation, retinal hemorrhages, serous and/or hemorrhagic retinal pigment epithelium detachments (PED), intraretinal fluid and/or cysts, choroidal neovascularization, choroidal effusion, cotton wool spots, or even optic nerve swelling. A detailed personal history along with a meticulous ophthalmologic examination in order to identify associated features is critical to establish a correct diagnosis. Sometimes the cause is readily apparent during fundus examination (e.g., choroidal tumor) but additional testing may be necessary depending on the clinical scenario (e.g., blood testing or even cerebrospinal fluid sampling when infectious or autoimmune etiologies are suspected).

Ancillary imaging like B-scan ultrasonography, computerized tomography, or magnetic resonance may be helpful in cases of hazy ocular media or retrobulbar pathology, whereas multimodal retinal imaging may assist in challenging cases (Kanski et al. 2011). With the advent of optical coherence tomography (OCT), the diagnosis of clinically asymptomatic serous elevations of the neurosensory retina has become more frequent. An optically empty space, filled with serous fluid, can be seen between the detached NSR and the RPE. OCT can be extremely valuable both in the differential diagnosis of subretinal fluid and in the monitoring of retinal changes during treatment (Yanoff and Duker 2014). Recently, advances in this imaging technique through enhanced depth imaging OCT (EDI-OCT) and swept-source OCT (SS-OCT) have been used to better evaluate choroidal changes in various diseases, such as central serous chorioretinopathy and Vogt-Koyanagi-Harada disease, thus enhancing our knowledge of the pathophysiological mechanisms involved. Fluorescein angiography (FA) and indocyanine green

angiography (ICGA) can help differentiate various diseases, identify specific areas of leakage, and guide focal laser treatment and photodynamic therapy, when appropriate.

Differential Diagnosis

The differential diagnosis of subretinal fluid includes (1) serous or hemorrhagic PED, (2) tractional retinal detachment, (3) rhegmatogenous retinal detachment, (4) retinoschisis and/or foveoschisis, (5) intraretinal fluid accumulation (including cystoid macular edema), and (6) choroidal detachment (Wolfensberger and Tufail 2000). When a thorough fundoscopic examination is insufficient to establish the presence of a serous detachment of the sensory retina with a high degree of certainty, ancillary tests should be used to complement the clinical evaluation. This is especially significant in situations where treatment depends on the presence/absence of retinal/subretinal fluid (e.g., photodynamic therapy for chronic central serous retinopathy or focal laser treatment for focal diabetic macular edema). From all the available instruments, OCT is definitely the most widely used. It is a noninvasive diagnostic tool that provides insight into the retinal morphology through high-resolution, cross-sectional images of the retina. It can easily identify the precise location of fluid accumulation (intraretinal/subretinal/sub-RPE/choroid), thus being used both for diagnosis and follow-up.

Cross-References

- ▶ Intraretinal Fluid
- ▶ Optical Coherence Tomography
- ▶ Retinal Detachment Exudative
- ▶ Retinal Pigment Epithelium
- ▶ Retina, Structure of

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