Swept-source optical coherence tomography in the management of scleral inflammation

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Purpose
To investigate the scleral changes observed in patients with active and inactive scleritis with a posterior segment swept source optical coherence tomography device (SS-OCT, Atlantis DRI OCT-1, Topcon, Japan).

Methods
SS-OCT images were acquired in patients with active unilateral scleritis and followed up until remission with sequential scans. Images were qualitatively and quantitatively assessed. Quantitative analysis included measurement of scleral thickness (conjunctiva+sclera). Qualitative analysis included the presence of: 1) subconjunctival hyporreflective areas, 2) scleral hyporreflective areas, 3) collagen fiber separation, 4) collagen fiber aggregation, 5) scleral destruction/scleral thinning areas. The normal fellow eye was used as a control.

Results
Twenty active scleritis eyes (19 patients) were included in the study. Of them, 75% had diffuse scleritis, 15% nodular scleritis, and 10% necrotizing scleritis. Mean scleral thickness was significantly higher during active phase compared to remission phase (891.5□241.7□m vs 687.4.8□142.1□m, $p<0.001$). No significant differences were observed between the inactive phase and the normal fellow eye (659.3□63.8, $p=0.63$). All eyes showed subconjunctival and scleral hyporreflective spaces in active phase, which resolved completely in remission (100% and 0%, respectively). Collagen fiber separation and aggregation was observed in 100% and 15% in active phase, and only 10% and 5% in remission. In our cohort, no differences in scleral destruction/scleral thinning were observed in active and inactive phase and were just seen in necrotizing scleritis eyes.

Conclusion
SS-OCT can be employed to obtain direct images of the sclera, allowing adequate identification of conjunctival and scleral layers that might render useful in the assessment of the scleral inflammation. The longer wave-length of the laser source permits accurate definition of fluid in the deep layers of the conjunctiva and sclera that might not be evident to clinical examination. These findings may have implications for the treatment of scleritis.

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