Commentary: Anterior segment optical coherence tomography characteristics and management of unique spectrum of foreign bodies in cornea and anterior chamber

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Corneal foreign bodies (FBs) constitute a common emergency in ophthalmic practice. Superficial corneal FBs, irrespective of their nature can be easily removed. However, it is deep intrastromal FBs that pose management challenges. The management of deep corneal FBs depends on their nature and location. Mostly, it is either metallic (iron) or wooden FBs warranting urgency. High-resolution anterior segment optical coherence tomography (AS-OCT), a non-invasive technology, has greatly enhanced the diagnosis and management of corneal diseases. X *et al*.[1] in their article entitled "Anterior segment optical coherence tomography characteristics and management of unique spectrum of foreign bodies in cornea and anterior chamber" describe the diagnosis and customized management strategies for corneal FBs like using high-resolution AS-OCT. The authors have described AS-OCT characteristics of FBs including metal, glass, gun pellet, plastic, caterpillar hair, silicon buckle, firecracker debris, stone chip particle, and human hair.

High-resolution AS-OCT clearly shows the fine structure of the cornea. The presence of a FB damages the consistency of the corneal structure, which provides the basis for the diagnosis of a FB. In the evaluation of AS-OCT images, the signal of the normal corneal tissue surrounding the lesions is used as a reference. If the signal of the lesions is stronger than the surrounding tissue signal, it is a hyperreflective signal (high signal). When the signal of the lesions was weaker than the surrounding tissue, it is a hyporeflective signal (low signal). If the signal deep in the FB was weaker or even disappeared, which was regarded as signal attenuation, it was called a shadowing effect.[2] A reflective signal is high in both metallic and non-metallic FBs. The border of metallic FBs is clear. Both metallic and non-metallic FBs show a shadowing effect.

Wang *et al*.[3] used three-dimensional (3D) OCT 200 (3D OCT-2000, Topcon, Tokyo, Japan) with a corneal module, which is a spectral domain OCT developed for diagnostic criteria. According to this study, history of eye injury, disturbing corneal layers architecture, high or low signals with clear boundaries, and central or marginal shadowing effects were diagnostic of FBs. In cases with a history of injury, disturbing consistency of corneal layers, high or low signals in the corneal stroma, and the presence of a central or marginal shadowing effect, a FB should be strongly suspected. In a patient with a history of injury, disturbing corneal stromal consistency, high signal with blurred margins, and in the absence of a shadowing effect, a FB is unlikely. In such a scenario, other conditions including corneal inflammation, corneal scarring, and malignant lesion of the cornea should be considered. AS-OCT characteristics are helpful to delineate the type of FB. Metals show high signals on the anterior border with a total posterior shadowing effect.[2,3] Wood also shows high signals with variable shadowing effects depending upon the density.[2,3] AS-OCT is helpful in the exact localization of the FBs in the corneal stroma. AS-OCT delineates clearly whether a corneal FB present in the posterior stroma has caused a breach in Descemet's membrane (DM). AS-OCT imaging is also helpful in diagnosing FBs in the anterior chamber and at the angle.[4] AS-OCT characteristics guide ophthalmology to customize the technique of FB removal. Corneal FBs present in the anterior or middle stroma may be removed externally. Corneal FBs lying in the posterior stroma and penetrating into the anterior chamber may need a combined external and internal approach.[1] In a case with three vertical full-thickness wooden FBs, one of these penetrating DM has been removed in toto using combined ab-externo and ab-interno techniques.[5] In this case, a spatula was used to push the FBs from within the anterior chamber and was picked up one by one as they projected above the corneal surface.[5] FBs present in the anterior chamber, the angle of the anterior chamber, and inadvertently slipping into the anterior chamber need an internal approach for removal.

Swept-source OCT device is of high resolution, AS-OCT. It is featuring a scan depth of 14.5 mm, a scan width of 16.5 mm with a 1300 nm light source wavelength, and can measure axial lengths in the range of 14–32 mm. It has a speed of approximately 100,000 scans per second.[6] Swept-source OCT is also helpful in visualizing anterior segment structures such as, LASIK flap, demarcation line following keratoconus treatment, Descemet's membrane detachments, corneal transplants, anterior chamber angle, iris, lens and axial length of the eye.[7]

High-resolution AS-OCT is a valuable tool in the diagnosis and management of corneal FBs and various other corneal disorders.

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