

Fleck-like deposits and swept source optical coherence tomography characteristics in a case of confirmed ocular chalcosis

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A 36-year-old male presented with history of injury in the left eye 3 years back with a copper wire. Examination revealed the presence of typical sunflower cataract with golden yellow deposits over the anterior lens capsule with dull glow and old vitreous hemorrhage. Non-contrast computerized tomography revealed retained intraocular foreign body in the pars plana region. The patient underwent phacoemulsification with intraocular lens implantation followed by pars plana vitrectomy and foreign body removal. Intraoperatively, fleck-like deposits were noted on the retinal surface in a circinate manner around the fovea and also over mid-peripheral retina. Postoperative swept source optical coherence tomography (SS-OCT) was performed to document the location of deposits and their characteristics. Limited literature exists regarding SS-OCT characteristics of ocular chalcosis.

Key words: Chalcosis, pars plana vitrectomy, penetrating injury, retained intraocular foreign body

Retained intraocular foreign body (RIOFB) is a common occurrence following open globe injury.^[1] Metallic foreign bodies including those of copper are the most commonly encountered. In case of copper foreign bodies, the copper content and size of foreign body determine ocular response and clinical presentation thereof. Foreign body with more than 90% of copper content may result in severe inflammation simulating endophthalmitis. Those with less copper content may take an indolent course leading to low-grade chronic inflammation.^[2,3] We describe a rare case of chalcosis following a retained copper foreign body.

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Case Report

A 36-year-old male presented with gradual painless progressive dimness of vision in left eye following penetrating injury with electric copper wire 3 years ago. The best-corrected visual acuity (BCVA) was 6/6 in the right eye and 6/60 in the left eye. The right eye was normal. The left eye showed clear cornea, 3+ cells in the anterior chamber, and brisk pupillary reaction. Anterior lens capsule demonstrated a golden yellow reflective sheen with sunflower cataract [Fig. 1]. Gonioscopy was within normal limits with intraocular pressure of 18 mmHg. Fundus examination showed media haze with the presence of vitreous membranes. Further details could not be appreciated. Non-contrast computerized tomography showed the presence of metallic intraocular foreign body in the temporal pars plana region. Ultrasonography showed no evidence of retinal detachment. In view of clinical changes in chalcosis, an electroretinogram was not performed.

The patient underwent phacoemulsification with intraocular lens implantation in the capsular bag. This was followed by 23-gauge pars plana vitrectomy a week later with removal of RIOFB through a separate midline sclerotomy. Intraoperatively, small brownish pigment clumps were noted in the periphery and in vitreous membranes. Foreign body was embedded in the temporal pars plana. Yellowish fleck-like preretinal deposits were noted over the posterior pole and mid-peripheral retina, imaging of which was done in the postoperative period [Fig. 2]. The foreign body was sent for experimental analysis to Indian Institute of Technology, New Delhi. The results of experimental analysis using energy-dispersive X-ray spectroscopy to provide details of the elemental constituents of the retrieved foreign body revealed that the metal foreign body was primarily made up of copper, with traces of other elements [Fig. 3 and Table 1].

Postoperatively, the patient regained BCVA of 6/9 with the presence of retractile fleck-like deposits over the macula [Fig. 4b]. Swept source optical coherence tomography (SS-OCT; DRI OCT Triton; Topcon, Tokyo, Japan) showed the presence of hyperreflective deposits over the internal limiting membrane and within inner retinal layers (intraretinal hyperreflective deposits) with after-shadows corresponding to fleck-like deposits [Fig. 4a and b]. All retinal layers including the ellipsoid zone and external limiting membrane appeared to be normal. Fundus autofluorescence showed the presence of hypoautofluorescence corresponding to distribution of flecks, due to blockage of underlying fluorescence [Fig. 5]. The patient was advised

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regular follow-up and maintained her clinical status at 9 months follow-up.

Discussion

Clinical features of retained copper foreign body depend on the percentage of copper content in the foreign body. Foreign body with more than 85% of copper content shows a generalized pattern of intraocular copper deposition, whereas foreign body with lower copper content shows a localized pattern of intraocular copper deposition in the adjacent areas.^[2,4] Copper has an affinity for deposition along basement membranes. It may be deposited over Descemet’s membrane seen clinically as Kayser–Fleischer ring. Yellowish brown pigmentation over the anterior lens capsule in a petaloid shape radiating from anterior axial pole of lens to equator may lead to formation of sunflower cataract.^[2] Reversible maculopathy in presumed ocular chalcosis has been described earlier;^[5] however, very limited literature exists regarding OCT characteristics of patient with chalcosis^[6] wherein enface OCT showed hyperreflective

deposits at the ILM. In cases with foreign body of pure copper (more than 90% of copper content), severe inflammatory reaction and intraocular necrosis may be seen.

In our case, the intraocular foreign body had a copper content of 66.89%. In addition, the foreign body was encapsulated over the pars plana region. A lesser copper content, encapsulated foreign body, and location at pars plana region may explain the indolent course in our case and presentation with gradual dimness of vision over 3 years. Our case did not show a Kayser–Fleischer ring. The anterior capsule of lens showed a yellowish brown sheen with sunflower cataract. Due to inflammation, vitreous membrane was seen in the posterior segment. Postoperatively, after clearing the media with vitrectomy, fleck-like deposits in the macula and mid-peripheral retina were noted (over the ILM) which are likely to be copper deposits.

Conclusion

This case highlights the important clinical dictum that all cases of open globe injury should be evaluated to rule out RIOFBs.

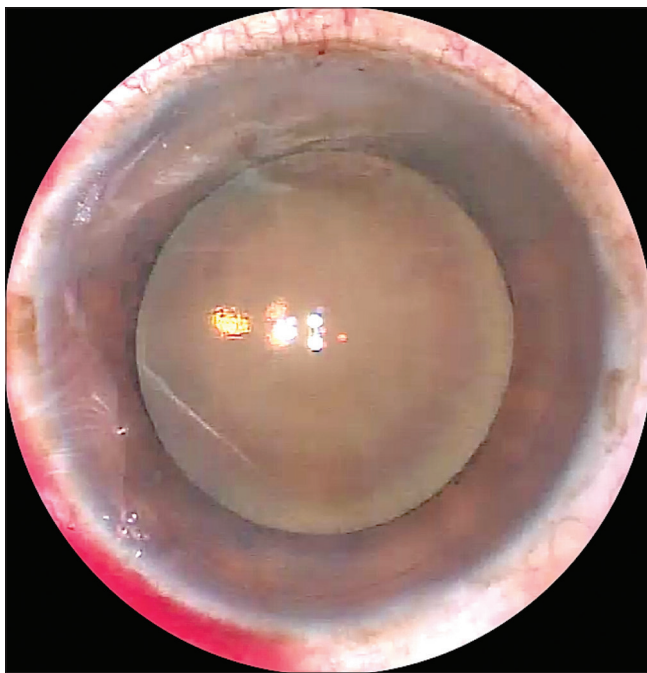


Figure 1: Intraoperative anterior segment photograph showing cataractous lens with golden yellow reflective sheen in a case of chalcosis

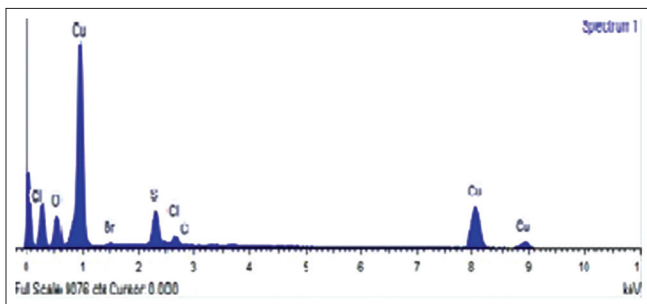


Figure 3: Energy-dispersive X-ray spectroscopy of the intraocular foreign body removed from pars plana showing its contents. Note that the copper content of the foreign body was found to be 66.89%

Table 1: Percentage of elements present in the retrieved foreign body as analyzed by energy-dispersive X-ray spectroscopy

Element	Weight (%)
Sulfur	5.610
Chlorine	1.551
Copper	66.890
Bromine	0.710
Oxygen	25.240

The foreign body had 66.89% of copper as its constituting element



Figure 2: Postoperative wide-field pseudocolor image of the patient showing presence of yellowish fleck-like deposits over the macula and in the mid-periphery

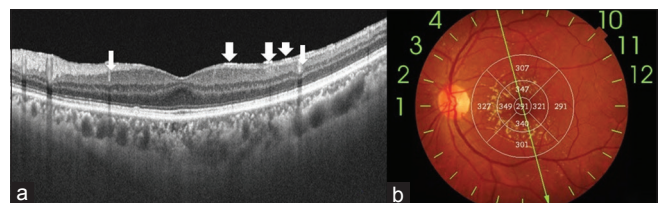


Figure 4: Swept source optical coherence tomography of the patient showing the presence of hyperreflective deposits over the internal limiting membrane and inner retinal layers (a) corresponding to fleck-like deposits on the fundus photograph (b)

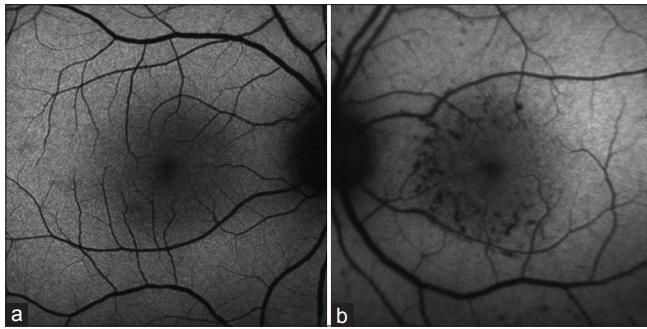


Figure 5: Fundus autofluorescence imaging of the patient showing normal autofluorescence in right eye (a), and the presence of hypofluorescence corresponding to distribution of flecks in left eye (b), probably due to blockage of underlying fluorescence

The undetected RIOFBs especially those of metal can lead to irreversible ocular damage by leading to metallosis.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients

understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

References

1. Gaudio AR. Intraocular foreign bodies. In: Albert DM, Jacobiec FA, editors. Principles and Practice of Ophthalmology. Philadelphia, PA: W.B. Saunders; 2000. p. 2514-30.
2. Rosenthal AR, Appleton B. Histochemical localization of intraocular copper foreign bodies. *Am J Ophthalmol* 1975;79:613-25.
3. Rosenthal AR, Marmor MF, Leuenberger P, Hopkins JL. Chalcosis: A study of natural history. *Ophthalmology* 1979;86:1956-72.
4. Rao NA, Tso MO, Rosenthal AR. Chalcosis in the human eye. A clinicopathologic study. *Arch Ophthalmol* 1976;94:1379-84.
5. Delaney WV Jr. Presumed ocular chalcosis: A reversible maculopathy. *Ann Ophthalmol* 1975;7:378-80.
6. Goel N. Spectral domain optical coherence tomography and *en-face* imaging in presumed ocular chalcosis. *Saudi J Ophthalmol* 2017;31:266-8.