

## Adaptive optics imaging in a case of welder's maculopathy

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**Key words:** Adaptive optics, maculopathy, welder

A 46-year-old male, welder by profession, presented to our center with blurred vision for a year. There was no redness, pain, metamorphosis, or loss of visual field. Patient gave no history of use of safety goggles at workplace. Visual acuity was 20/20 OD and 20/40 OS. A 2 × 2 mm nebular corneal opacity was noted OD nasally. Fundoscopy revealed a faint yellowish foveal spot OU, more prominent in OS than OD, and a dull foveal reflex OU [Fig. 1].

Spectral-domain optical coherence tomography (SD-OCT) revealed disruption of IS-OS junction OU and disruption of external limiting membrane OS [Fig. 2]. Adaptive optics (AO) (Rtx 1) imaging detected reduction in cone photoreceptor density and alteration in cone photoreceptor mosaic arrangement OU at the foveal region [Fig. 3]. A diagnosis of Welder's maculopathy was made. Patient was advised protective filters at work and periodic follow-up.

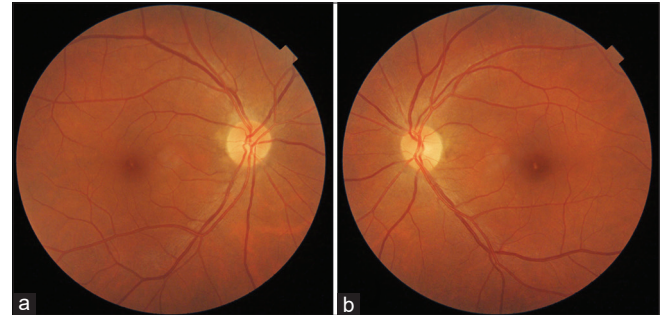
### Discussion

Photoc retinopathy is photochemical damage occurring at the level of photoreceptors due to direct exposure to bright light (sun, laser, or welding arc). The causes may include history of sun-gazing, eclipse viewing, use of laser pointer or occupation such as welding.

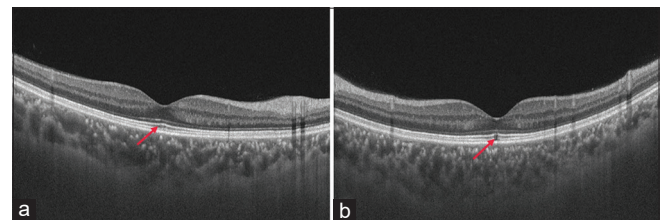
Chronic retinal injury due to welding arc can manifest as yellowish foveal spot/ring, lamellar macular hole, and permanent visual impairment.<sup>[1-3]</sup> AO imaging in our case was done using the Rtx 1 model which operates at a wavelength of 750 nm and neutralizes lower and higher order optical aberrations. Each image obtained is an average of forty frames of a 4° × 4° retinal area with good test-retest reliability.<sup>[4,5]</sup> Our case

demonstrated marked reduction in foveal cone photoreceptor density and its mosaic arrangement OU, thus, showing far greater involvement than seen clinically [Table 1].

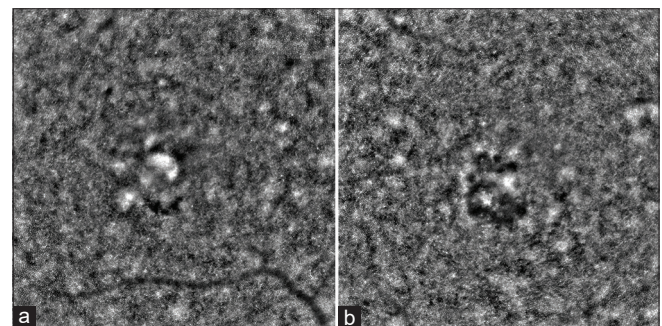
Although constraint of high cost limits its widespread availability, AO imaging is more sensitive and offers an



**Figure 1:** Fundus photograph OD (a) and OS (b) showing faint yellowish foveal spot and dull foveal reflex



**Figure 2:** Optical coherence tomography OD (a) and OS (b) showing disruption of IS-OS junction OU, disruption of external limiting membrane (ELM) OS



**Figure 3:** Adaptive optics (AO) retina OD (a) and OS (b) showing reduction in cone photoreceptor density and alteration in cone mosaic arrangement

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**Table 1: Foveal cone characteristics in our patient vs. normative data**

Parameter tested	Our patient data		Normative data in Indian population
	Right eye	Left eye	
Mean cone density at 2° off fixation	20967±340 cells/mm <sup>2</sup>	19279±643 cells/mm <sup>2</sup>	26448±687 cells/mm <sup>2</sup>
Spacing	7.6±0.11 µm	7.97±0.11 µm	6.75±0.11 µm
Regularity	92.3±4.9%	92.8±4.4%	94.83±1.28%
Dispersion	12.28±3.2%	12.8±3.4%	11.22.68±0.79%

accurate assessment of photoreceptor damage which may otherwise remain undetected clinically.

#### 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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Nil

#### Conflicts of interest

There are no conflicts of interest.

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