

LASER-INDUCED RETINAL INJURY IN CHILDREN: A PUBLIC HEALTH RISK

Adam Geressu MD¹, Jayaprakash Patil MBBS, MS, FRCOphth¹

1 Royal Lancaster Infirmary, Lancaster, UK

Introduction

- There is increasing evidence that high -powered hand-held laser devices cause retinal injury. 1
- Due to an increase global demand in cheaper and more accessible high -power laser pointers, these devices have become more readily available for public use via internet. Laser-related retinal injury is based on both patientrelated (eg. pupil size, refractive status,
- degree of retinal pigmentation, proximity of incident laser beam to the fovea) and laser related factors (eg. wavelength, pulsatile duration, and energy of the laser beam). ³
- Certain safeguards have been introduced to protect consumers from laser induced injuries (such as the BS EN 60825 -1:2014 in the UK). It is recommended that a laser pointer should be no greater than a Class 2 laser product. In Great Britain, general use of Class IIIa lasers are banned, 4,5

Figure 2: Fundoscopy findings in patients 1 -3



Case 3: A 10-year-old boy presented with difficultyviewing the board at school. BCVA was 6/6 in his left eye and 6/5 in right eye. On visual examination patient appeared to have micropsia. Fundoscopy was normal apart from small vitreous floaters in inferior region of his left eye (Figure 2).

Case 4: A A 12-year-old boy presented history of blurry vision in both his eyes. BCVA was 6/9 in both eyes. On further examination he had bilateral multiple macularatrophic lesions. OCT showed localised sub-foveal hyper-reflective areas of atrophy involving the outer retinal layers, photoreceptors and retinal pigment epitheliumto some exten (Figure 3 and 4). Case 6: A 12-year-old boy was referred to ophthalmology clinic after having decreased vision in his left eye. BCVA was 6/6 in right eye and 6/60 in left eye. On further examination here was scarring and bleeding in macula of left eye.

Case 7: A 13-year-old boy presented after having difficulty writing small letters. BCVA was 6/36 in right eye and 6/9 in left eye. On visual examination there was a low degree of hypermetropia noted. On further examination there was a macular burn seen in both eyes with retinal pigment epithelium changes.

Case 8: A 6-year-old boy presented with a history of decreased vision in his right eye. He was referred due to a cracked appearance of his right macula. BCVA was 6/9 in right eye and 6/6 in left eye. On further examination there was an area of retinal pigment epithelium atrophy in his right macula.

Case 9: A 10-year-old boy presented to the clinic after seeing a white blob in his central vision along with flashing lights in his left eve. BCVA was 6/7.5 in right eve and 6/5 in left eve. Fundoscopy shows three fine drusen of his right eve and hypopigmented macular changes at level of retinal pigment epithelium in his left eve. there was no subretinal fluid or haemorrhagic changes in either eye.

Table 1: Summary of case series

Patient	Ap	e at esentation	Laterality	BCVA at Presentation (OD,OS)	Examination Findings	Laser use	Follow-up months
	1	9-year-old	Left eye	(6/18, 6/6)	Central scotoma on closing her left eye	Laser Pointer bought from Egypt	12
	2	7-year-old	Right eye	(6/9, 6/5)	Hyperpigmentary changes in right eye	Laser toy bought from Spain	11
	3	10-year-old	Left eye	(6/6, 6/5)	Micropsia and small vitreous floaters in left eye	Laser toy use	,
	4	12-year-old	Both eyes	(6/9, 6/9)	Bilateral multiple macular atrophic lesions	Laser pointer	9
4	5	11-year-old	Both eyes	(6/12, 6/9)	Retinal pigment epithelium (RPE) disturbance in right macula	Laser toy use	6
	6	12-year-old	Left eye	(6/60, 6/6)	Scarring and bleeding in macula of left eye	Laser toy use	12
3	,	13-year-old	Both eyes	(6/36, 6/9)	Macular burns seen in both eyes with RPE changes	Laser toy use	12
1	8	6-year-old	Right eye	(6/9, 6/6)	RPE atrophy in right macula	Laser toy use	12
	9	10-year-old	Left eye	(6/5, 6/7.5)	Fine drusen in right macula and hypopigmented changes in left macula	Laser toy use	12

Aim

· The aim is to raise awareness of laser-induced retinal injury especially among children.

Methods

- We present our findings as a case series of nine children with retinal injury secondary to probablelaser use in the form of laser toys or laser pointer gable 1).
- This study was carried out at the University Hospitals of Morecambe Bay NHS Foundation Trust Hospitals.

Results

Case 1: A 9-year-old girl presented with a history of decreased vision in her left eye. Best correctedvision acuity (BCVA) in her left eve was 6/18 and 6/6 in right eve. On clinical examination patient had central scotoma on closing her left eve. Fundoscopy revealed she had left macular atrophic lesion with scarring, while right macula is healthig 2).



Case 2: A 7-year-old boy was referred to ophthalmology clinic from an optician for having pigmentary changes in right eye. OCT findings were provided (Figure1). Fundoscopy showed hyperpigmentary changes that were not seen before (Figure 2). BCVA was 6/9 in right eye and 6/5 in left eye.

Figure 1: OCT findings in right eye of child in case 2.

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Figure 3: OCT finding of right eve of child in case 4

Figure 4: OCT finding of left eve of child in case 4.

Case 5: A 11-year-old boy was referred to the ophthalmology clinic due to macula pigmentary changes in right eye. He was visually asymptomatic. BCVA was 6/12 in right eve and 6/9 in left eve. Fundoscopy revealed retinal epithelial pigment disturbances in the macula of right eve, while left macula was unremarkable...



Figure 5: OCT finding in right eye of child in case 5.

Conclusion

Laser devices bought from countries abroad often do not conform to EU or British Safety Standards (BS EN 60825 -1:2014), allowing for the distribution of unsafe products and leading to preventable retinal injury.

To reduce laser-induced retinal injury especially in children we should raise public awareness and educate clinicians on the hi story/presentation to prevent poor prognosis and improve health outcomes in their patients.