

Paediatric Ocular Barotrauma by a Cupping Therapeutic Device

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Case report

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Abstract

Background Commercially available cupping devices are increasingly being used for cupping therapy. However, with improper use they may induce unwanted barotrauma. **Case Presentation** A 6 year old child from Hong Kong applied a cupping device to her own eye. It resulted in periorbital ecchymosis and subconjunctival hemorrhage which resolved without sequelae after a course of topical antibiotics. **Conclusion** This case highlights the need to raise public awareness about the proper use of cupping devices and its risk in inducing ocular injuries.

Background

Cupping therapy is an ancient form of alternative medicine which aims to heal by improving blood circulation via creation of negative pressure. Recently, this ancient therapy has been popularised in modern culture by Olympians who stepped onto the Olympics arena with their bodies covered in “cup” shaped bruises. With increasing applications found for cupping therapy such as Bell’s palsy and herpes zoster, flash cupping and moving cupping can now be used on the face including periorbital regions, possibility of ocular trauma should be highlighted and care taken to avoid its occurrence.

Case Presentation

A 6 year-old child presented with left periorbital bruising after accidental application of a commercial silicone cupping device over her left eye (Figure 1). She subsequently pulled the device off after 1-2 minutes. Patient developed immediate localised periorbital erythema and swelling (Figure 2a). Three days later, delayed circumferential subconjunctival haemorrhage became apparent. The child reported mild periorbital pain only. On examination, her visual acuity was 0.9 over the right eye and 0.8 over the left eye. Intra-ocular pressures were normal. She had left periorbital ecchymosis in a circular fashion corresponding to the site of device placement. There was diffuse non-bullous subconjunctival hemorrhage over 2 o’clock to 9 o’clock bulbar conjunctiva (Figure 2b). The anterior segment was otherwise unremarkable with globe integrity without anterior chamber inflammation or hyphaema. Mydriatic fundal examination revealed that the retina was attached in the four quadrants with no commotio retinae, no haemorrhages and no retinal nor choroidal detachment (Figure 2c).

She was given a course of topical antibiotics. The visual acuity measured on subsequent follow up was 0.9 in both eyes. The ecchymosis and subconjunctival hemorrhage resolved in three weeks without any long-term sequelae.

Discussion And Conclusions

An initial impact injury by cupping device occurs when the patient pressed the cup onto her eye, followed by vacuum injury when she later tried to remove the device. In view of the soft material of the silicone

cup and the minimal acceleration force applied, the initial impact force is attenuated. Hence our patient did not develop coup/contrecoup injuries due to minimal forces being transmitted to the posterior eye.

The more important force that played part here is a suction force. Ocular barotrauma caused by mask squeeze during scuba diving shares similarity in mechanism of injury with our case. As a diver descends and the surrounding pressure increases, the air in his mask is compressed in accordance with Boyle's law, creating a suction force on the face. This could lead to eye injuries including subconjunctival hemorrhage, periorbital petechial haemorrhage and in severe cases, hyphema^[ii]. The therapeutic effect of cupping relies on creating a local negative pressure to promote blood circulation by capillary expansion, rupture of blood vessels and autohemolysis^[iii]. A negative pressure is created by the silicone cup as the child presses it onto her globe, thereby squeezing air out and the subsequent pulling action effectively creates a vacuum, or suction force on the globe. This increase in transmural pressure could lead to rupture and hemorrhage, accounting for the periorbital ecchymosis and subconjunctival hemorrhage observed in this case. A pressure of 40-100mmHg is needed to cause stress failure in pulmonary capillaries in animals^[iii]. Furthermore, the stretching force may lead to pseudoproptosis, overstretching of the optic nerve and retro-orbital vasculature. Fortunately, such complications did not occur in our patient. However, cupping devices in professional settings are capable of creating much higher negative pressures in the range of 300-610mmHg^[iv] and may lead to such injuries if improperly used.

The ocular barotrauma described in this case is distinctive from that observed during laser *in situ* keratomileusis and femtosecond cataract surgeries where a vacuum ring is applied directly onto the ocular globe. During flap creation using microkeratome, the transient iatrogenic intraocular pressure spike (reported to exceed 100mmHg^[v]), could lead to rhegmatogenous events or damage to retinal ganglion cells. In contrast, as pressure = force / area, the suction force of the silicone cup used by our patient is spread out across the periorbital region and will unlikely cause increased intraocular pressure.

With increasing popularity of cupping treatment, this case highlights the need for public awareness to prevent ocular injuries from occurring when using cupping devices.

Declarations

The authors declare that they have no competing interest

Institutional board review approval was not required for this case report.

Informed consent from the patient's parent for publication of this case report was obtained.

Data availability: Not applicable.

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ET and KL were the chief physicians for the case. SL and GT wrote the manuscript. All authors read and approved the final manuscript.

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Figures



Figure 1

Figure 1.



Figure 2

Figure 2a.



Figure 3

Figure 2b.

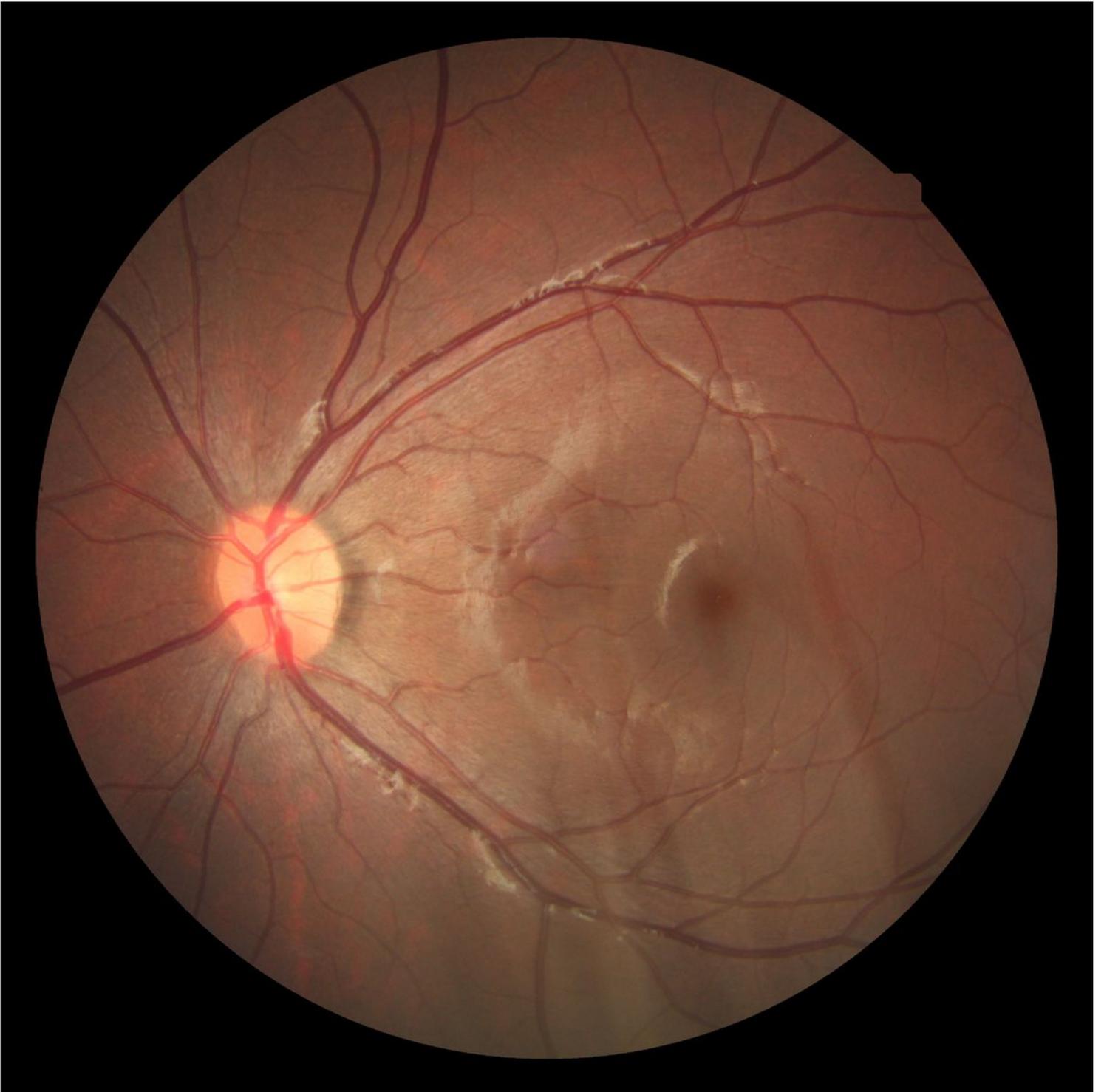


Figure 4

Figure 2c.

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