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Eye (2017) 31, 1113–1114; doi:10.1038/eye.2017.15; published online 24 February 2017

Sir,
Regarding ‘Advances of optical coherence tomography in myopia and pathologic myopia’

We read with interest the article ‘Advances of optical coherence tomography in myopia and pathologic myopia.’¹ In this article, the authors cite the original definition of dome-shaped macula (DSM) by Gaucher *et al*² as ‘an inward bulge of the macula within the concavity of a posterior staphyloma in highly myopic eyes,’ and go on to expound the ‘many uncertainties’ regarding DSM. Specifically, the authors outline several theories for the development of DSM: ‘resistance to deformation of scleral staphyloma, scleral infolding through the collapse of the posterior portion of the eye wall, and tangential vitreoretinal traction.’¹ We would like to present a novel mechanical explanation for the development and pathophysiology of DSM based on the fundamental physical principles of Pascal’s principle and Laplace’s law.

Pascal’s principle³ tells us that the internal pressure inside of a closed vessel, such as the eye as a whole (or a blood vessel or a tube containing fluid), is the same throughout, despite variations in radius or diameter of the vessel. Laplace’s law⁴ goes on to define the relationship between the radius of that vessel and wall tension, given the constant internal pressure (Figure 1). In an enclosed vessel such as a theoretical eye with uniform elasticity and

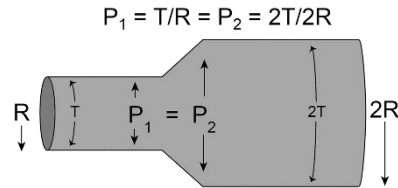


Figure 1 Laplace’s Law.

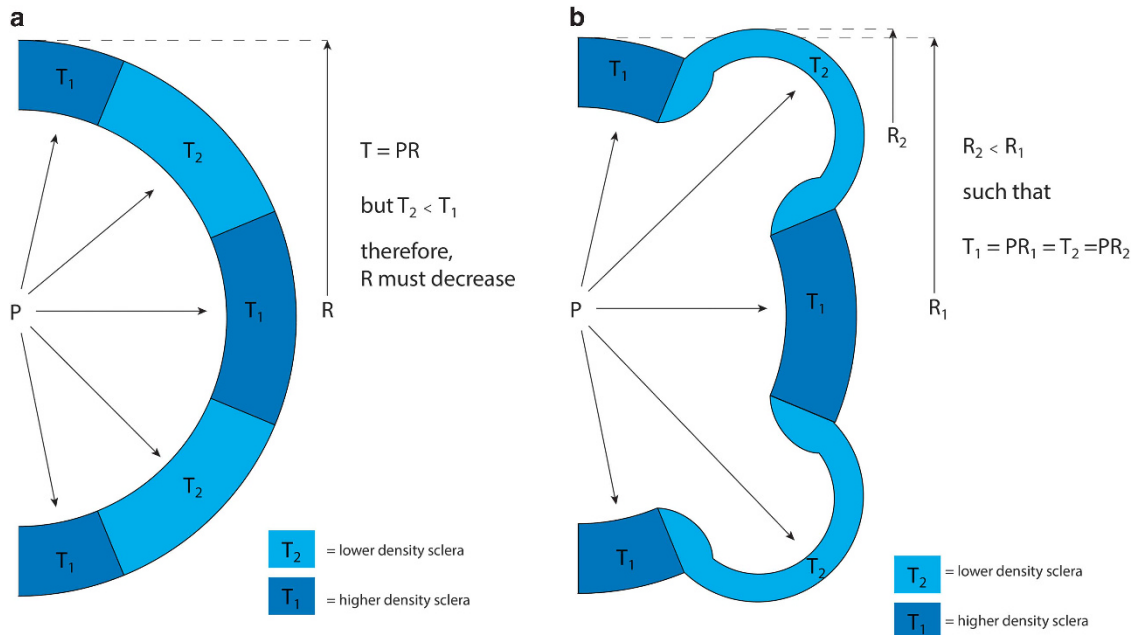


Figure 2 Pascal’s Principle and Laplace’s Law in Dome-Shaped Macula (DSM).

thickness, wall tension increases with increased radius, although the radius cannot rapidly increase if the wall is not very elastic. However, if the very makeup of the wall varies from place to place, thicker or less elastic in one area as opposed to another, one would expect variation to develop over time in the radius of that portion of the vessel with varying wall thickness (Figure 2a). In DSM, it is known that there is an annulus of scleral thinning around a central area of macular scleral thickening.⁵ The annular area of scleral thinning would be expected to stretch to a greater degree than the central (sub-macular sclera), where the sclera is known to be thickened. The result is a central area that is less distended than the area of scleral thinning surrounding it, producing the characteristic dome-shaped appearance of DSM (Figure 2b).

Conflict of interest

The authors declare no conflict of interest.

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Eye (2017) **31**, 1114–1115; doi:10.1038/eye.2017.29;
published online 10 March 2017

Sir, Bispectral index monitoring in vitrectomy surgery under local anaesthetic block with sedation: a single surgeon, single anaesthetist review

We have undertaken a case review using the Bispectral index monitoring (BIS, Covidien—Medtronic, Boulder, CO, USA) in vitrectomy surgery under local anaesthesia, and would suggest that it may have a role in improving

surgeon satisfaction and reducing intraoperative movements.

The BIS considers the EEG and EMG data, monitoring parameters of the waveforms to provide a final score that may be used to assist with titrating sedation. The exact level to target in the operating room is still unknown, with Kelley suggesting that for moderate sedation, a BIS of 80 is appropriate with a broader range extending from 70–100 also provided.¹

Case series

We present a case series of 54 patients undergoing a vitrectomy for retinal detachment, macular hole repair or epiretinal membrane peel, who were followed prospectively by a single surgeon and anaesthetist. A predominance of peribulbar blocks with 1% ropivacaine and 150 IU hyaluronidase and an average of 50 µg of intravenous fentanyl and propofol titrated for the patient's comfort were used. Intraoperative target-controlled infusion of propofol was programmed to a serum level utilising the patient's age and weight. Adjustments to the infusion were made by the anaesthetist based on BIS and clinical parameters collectively.

A mean surgeon satisfaction of 8.8 (95% CI 8.3–9.3), was recorded with a peak at a mean BIS level of 80–85 and 85–90. See Figure 1. This was recorded immediately after the surgery had been completed, and was measured using a 10 cm linear scale to allow for a continuous variable.

Optimal outcomes in vitrectomies are dependant on a low number of intraoperative movements. In our series

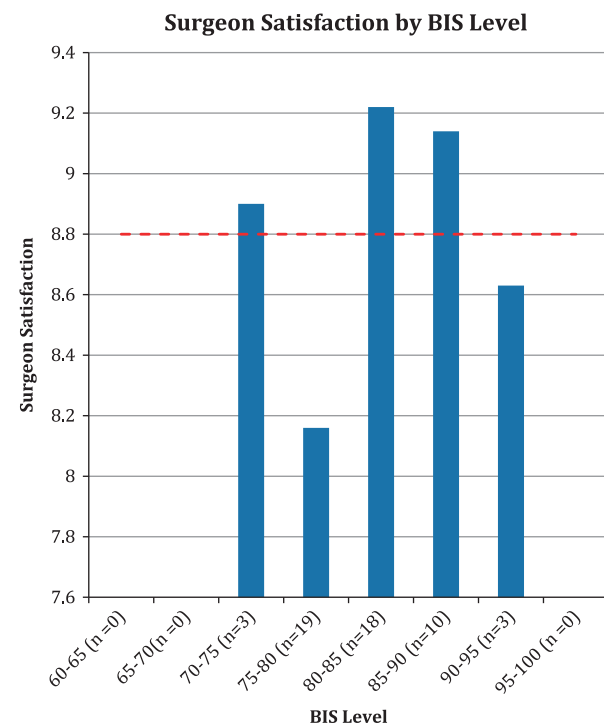


Figure 1 Levels of surgeon satisfaction by mean BIS level. Mean satisfaction is shown by the dotted line.