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Case Report Open Access

Macular Hole Eruption after Pars Plana Vitrectomy

Paul Rainsbury[1*], **Emily Gosse**[2] **and Jonathan Lochhead**[3]

[1]*Department of Ophthalmology, Queen Alexandra Hospital, Portsmouth, Hants UK*

[2]*Department of Ophthalmology, Nottingham University Hospitals, Nottingham, Notts, UK*

[3]*Department of Ophthalmology, St. Mary's Hospital, Parkhurst Rd, Newport, Isle of Wight, UK*

[*]**Corresponding author:** Paul G Rainsbury MRCS, Department of Ophthalmology, Queen Alexandra Hospital, Portsmouth, Hants UK. Telephone: 0044 23 9228 6000; Fax: 00441962712145; E-mail: paul.rainsbury@nhs.net

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Abstract

Macular hole eruption is a previously unreported complication of vitrectomy for full thickness macular hole (FTMH) repair.

Keywords Macular hole; Plana vitrectomy; FTMH repair

Case Report

An 83 year old male presented with a full thickness macular hole. The visual acuity was 6/24 in the right eye, measured using a standard 6 m Snellen chart. A standard 25-Gauge 3-port (non-valved) pars plana vitrectomy, internal limiting membrane (ILM) peel and gas tamponade was performed on the right eye (Figure 1A). The procedure was performed using the Alcon Constellation system, with the infusion pressure set at 25-35 mmHg throughout the procedure. This machine incorporates an automated IOP stabilisation system, which significantly reduces fluctuations in intraocular pressure perioperatively. After vitrectomy the ILM was stained with Dual Blue dye (under fluid). Peeling of the ILM was then commenced, without any adjustment of the IOP setting of the vitrectomy machine. During the peel stage, irrigation fluid surged from the infusion port following removal of the ILM forceps, resulting in a jet of fluid directly entering the macular hole, causing it to visibly erupt. On re-inserting the forceps the flow of fluid through the eye was stabilised.

The FTMH was noted to have torn inferiorly and superiorly and a small area of localised retinal detachment was noted around the hole (Figure 2A and B). The ILM peeling was then carefully completed with removal of approximately 2 disc diameters of ILM from around the centre of the macular hole (see supplementary online video), followed by routine fluid/air/gas (C3F8 18%) exchange. No additional procedures were required for the localised retinal detachment which flattened with the intraocular gas tamponade. Postoperatively the FTMH closed (Figure 1B) and the patient achieved 6/24 vision.

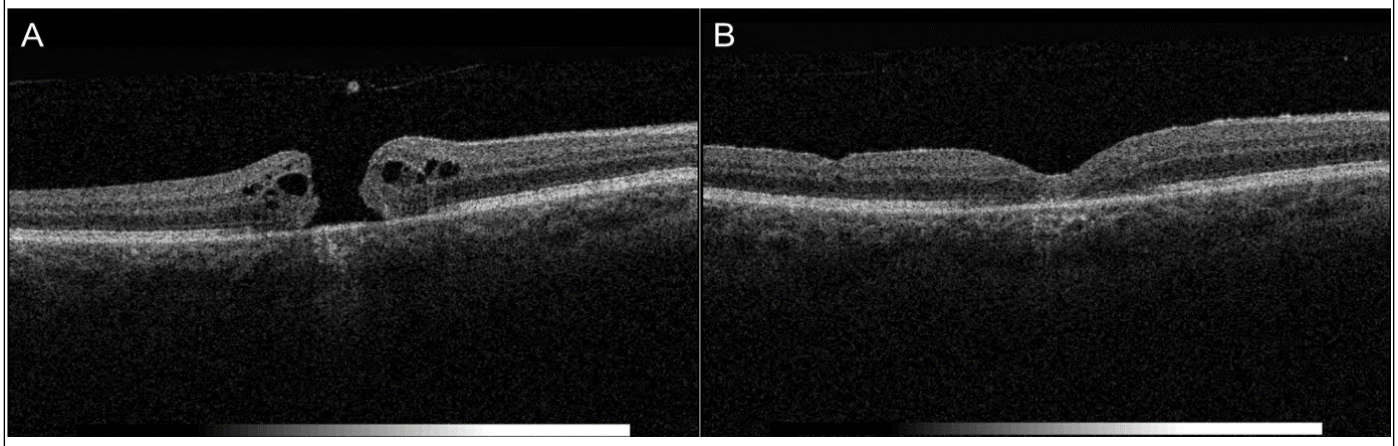

Figure 1: Preoperative (A) and postoperative (B) OCT scans. Postoperatively the macular hole closed, but significant disruption of the ellipsoid zone of the outer retina resulted in no improvement in visual acuity compared to preoperatively.

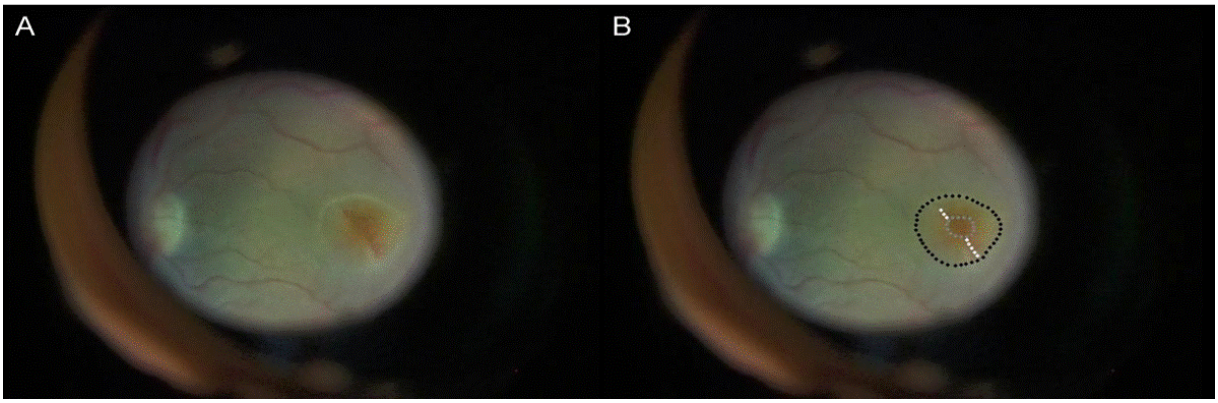

Figure 2: Macular hole torn inferiorly and superiorly (A). Changes outlined (B); black lines showing localised retinal detachment, white lines showing tears, grey line showing original extent of macular hole.

Comment

Position and angle of infusion cannula during vitrectomy is known to be an important factor in intraoperative complications such as serous retinal detachment and choroidal haemorrhage [1,2]. More specifically during macular hole surgery there is evidence that FAX can be associated with visual field defects corresponding with the position and direction of this cannula [3-5].

We routinely use valved 25-Gauge vitrectomy trochars. Since valved trocars were unavailable on this occasion, a 25-Guage non-valved system was used. The valved system allows irrigation into, but not out of, the eye (Figure 3A). Fluid influx is therefore controlled by the vitrectomy machine. With non-valved systems fluid can freely exit the eye following removal of instruments, until a plug is inserted into the ports. If the ports are left open, fluid can continuously flow through the eye. The infusion rate in this case was set at 25-35 mmHg. We believe that this port was angled steeply, allowing a jet of Balanced Salt Solution (BSS) to be inadvertently aimed directly at the macular hole (Figure 3B). In this case the macular hole eruption occurred after staining the ILM in a BSS filled eye. Some surgeons however, stain the ILM in an air-filled eye to avoid dye dispersion, allowing a better stain. If this additional step is performed, a further air/fluid exchange is required to remove the dye before ILM peeling. Other authors have reported retinal damage during this air/fluid exchange [6], however to the best of our knowledge, this is the first time retinal damage has been reported in a BSS filled eye.

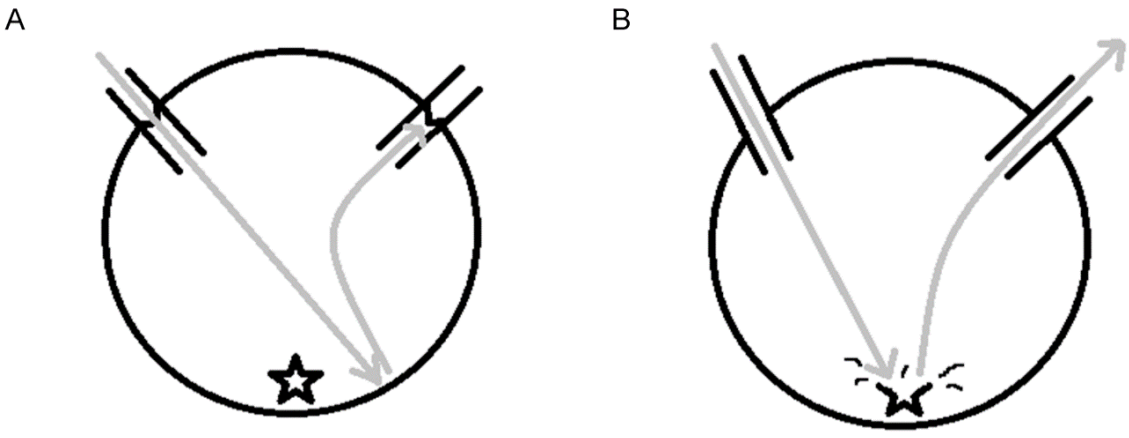

Figure 3: Valved vitrectomy ports regulate fluid entry into the eye (A). Valveless ports do not, and high pressure fluid may therefore enter the macular hole if the cannula is directed steeply (B).

Whilst non-valved trocars are commonly used worldwide, this appears to be a rare complication. We feel that it was the combination of a sudden surge of infusion fluid in a non-valved system that was responsible for this complication, and that the use of non-valved cannulas on their own without a surge of fluid is unlikely to result in this problem. We would like to highlight this potential complication to surgeons using non-valved vitrectomy ports during macular hole surgery. We suggest consciously directing the infusion port during set up, away from the macula towards the nasal retina.

Conflict of Interest

The authors declare no conflict of interest. The data has been presented at the British and Eira Association of Vitreoretinal Surgeons annual conference in 2013.

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