• Letter to the Editor •

Haemorrhagic retinopathy with subfoveal haemorrhage following endoscopic spine surgery: a case report

Nor Azimah Abd Aziz[1,2], *Nurliyana Ain Abdul Ghani*[1,2], *Chee Wai Yip*[3], *Shelina Oli Mohamed*[1,2]

[1]Department of Ophthalmology, Faculty of Medicine, Universiti Teknologi MARA, Sungai Buloh Campus, Jalan Hospital, Sungai Buloh 47000, Selangor, Malaysia
[2]Ophthalmology Clinic, Hospital Al-Sultan Abdullah, Universiti Teknologi MARA, Puncak Alam 42300, Selangor, Malaysia
[3]Ophthalmology Clinic, Pantai Hospital, Jalan Tun Abdul Razak, Ayer Keroh 75450, Melaka, Malaysia
Correspondence to: Shelina Oli Mohamed. Department of Ophthalmology, Faculty of Medicine, Universiti Teknologi MARA, Sungai Buloh Campus, Jalan Hospital, Sungai Buloh 47000, Selangor, Malaysia. shelin06@gmail.com; shelina@uitm.edu.my
Received: 2024-11-28 Accepted: 2025-07-28

DOI:10.18240/ijo.2025.12.25

Citation: Abd Aziz NA, Abdul Ghani NA, Yip CW, Mohamed SO. Haemorrhagic retinopathy with subfoveal haemorrhage following endoscopic spine surgery: a case report. *Int J Ophthalmol* 2025;18(12):2397-2399

Dear Editor,

We present a rare case of postoperative visual loss attributed to haemorrhagic retinopathy with delayed presentation following an uncomplicated unilateral biportal endoscopic L5S1 rhizolysis. Postoperative visual loss is a rare but devastating complication following spinal surgery[1-2]. Recognised causes include ischemic optic neuropathy, occlusive vasculopathy and cortical blindness[1]. Bilateral haemorrhagic retinopathy is an uncommon complication mentioned in the literature. While the exact mechanism remains unknown, sudden expansion in cerebrospinal fluid (CSF) volume with subsequent high intracranial pressure has been hypothesised as a plausible cause[3-5]. This case report adhered to the Declaration of Helsinki. Written informed consent was obtained from the patient for publication.

CASE REPORT

A 42-year-old lady complained of sudden right blurring of vision with a central scotoma and severe headache. Symptoms developed following uneventful unilateral biportal endoscopic L5S1 rhizolysis for extruded L5S1 disc and right sciatica under general anaesthesia (GA). There was no barking postoperatively on the reversal of GA. She was otherwise well systemically with no known medical illness or drug history. She visited the ophthalmologist a month later when symptoms persisted. Right visual acuity (VA) was counting fingers at two feet (CF2ft) and 6/9 on the left. Anterior segment examination was unremarkable, with normal intraocular pressures. Right fundus examination revealed a preretinal haemorrhage over the superotemporal arcade, and a circumscribed subretinal haemorrhage superotemporally extending to the macula, with dense yellowish-white depigmented blood involving the fovea (Figure 1A). Left fundus examination revealed a liquefied preretinal haemorrhage nasally and an epiretinal membrane (ERM) at the superior macula (Figure 1D). Otherwise, no orange nodules, subretinal exudation, macroaneurysms, sclerosed vessels, telangiectatic vessels or neovascularisation was observed in either eye.

Right macula optical coherence tomography (OCT) showed dome-shaped hyper-reflective subretinal material involving the fovea obscuring the ellipsoid layer (EL) and external limiting membrane (ELM; Figure 1C). Superotemporally, hyper-reflective sub-internal limiting membrane (sub-ILM) blood was present (Figure 1B). There were no polyps or branching vascular networks seen on optical coherence tomography angiography (OCTA). Right fundus fluorescein angiography (FFA) showed delayed filling of the superotemporal vein with masking from the preretinal haemorrhage (Figure 1G, 1H). There was no evidence of leakage.

She was diagnosed with bilateral hemorrhagic retinopathy and right submacular haemorrhage post-endoscopic spinal surgery (Figure 2A). She received intravitreal (IVT) aflibercept injection to the right eye. Four weeks later resolution of subfoveal haemorrhage was seen but VA remained at CF2ft (Figure 2B). A second dose of IVT aflibercept was administered. VA was 4/60 at week 10 and she refused further injections. OCT showed residual hyperreflective material over the retinal pigment epithelium (RPE), and the EL and ELM was not visible (Figure 2C). VA improved to 6/9 at week 16. The EL was visible with irregular disruptions.

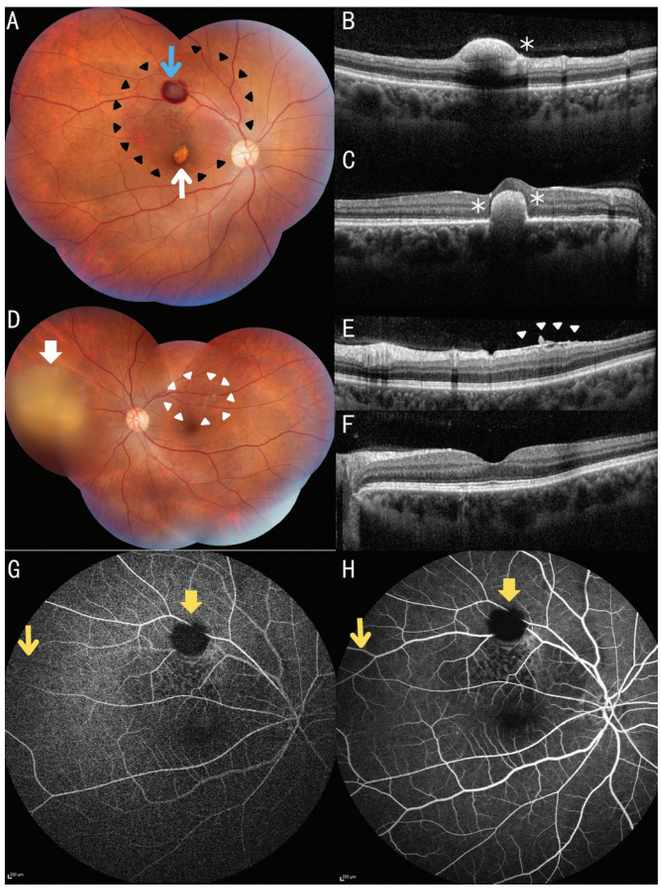

Figure 1 Baseline fundus and corresponding OCT images A: Right fundus showing small preretinal haemorrhage (blue arrow) overlying the superior vascular arcade and surrounding subretinal haemorrhage (black arrowheads) involving the macula with impacted organised depigmented subfoveal haemorrhage (white arrow). B: Hyperreflective sub-ILM haemorrhage superiorly (*); C: Subfoveal hyperreflective material (**). D: Left fundus showing preretinal haemorrhage nasally (thick white arrow) with ERM at the macula superiorly (white arrowhead); E: Corresponding ERM on OCT (white arrowhead). Sparing the fovea (F), early (G) and mid-venous phase (H) of the FFA showing delayed filling of the superotemporal vein (yellow arrow) and masking from the superotemporal preretinal haemorrhage (thick yellow arrow). OCT: Optical coherence tomography; ILM: Internal limiting membrane; ERM: Epiretinal membrane; FFA: Fundus fluorescein angiography.

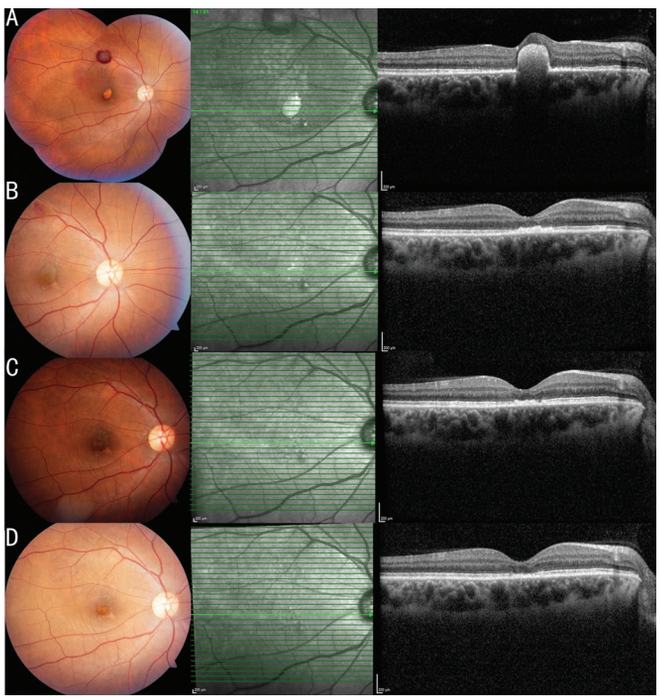

Figure 2 Serial fundus images and corresponding OCT of the right eye A: Baseline fundus showing subretinal haemorrhage with well-defined, organised depigmented subfoveal haemorrhage. OCT showing subfoveal hyperreflective blood. B: Week 4 (reduction of subfoveal haemorrhage with a marked decrease of OCT hyperreflective material); C: Week 10 (the further resolution of hyperreflective material on OCT); D: Week 16 (the irregular appearance of the ellipsoid layer on OCT). OCT: Optical coherence tomography.

Perioperative visual loss (POVL) following spine surgery is rare but potentially devastating. The incidence is between 0.03% and 0.2%, with posterior ischaemic optic neuropathy (PION) being the primary cause in 89% of patients. The most common aetiology is attributable to infarction of the arterial supply to the optic nerve[1]. Risk factors include hypotension, excessive blood loss, prolonged surgery, hypoxia, high venous pressure, use of vasopressors and poor head positioning. Haemorrhagic retinopathy following endoscopic spine surgery is a rare occurrence[2]. Moschos *et al*[3] reported acute visual loss with bilateral extensive preretinal, subhyaloid, and subretinal haemorrhages. Kord Valeshabad *et al*[6] described a similar patient with bilateral deep retinal haemorrhages associated with seizures resembling Terson's syndrome.

Although precise mechanisms are unclear, spinal surgical procedures may induce an abrupt expansion in CSF volume and cause an increase in intracranial pressure[5]. Lee *et al*[5] described haemorrhagic retinopathy associated with transient unconsciousness following biportal endoscopic spine surgery (BESS) in a healthy young adult. The postulated mechanism involved a sudden rise in epidural pressure from the endoscopic irrigation system. During endoscopic surgery, CSF pressure may rise due to fluid injected into the epidural space. Increasing CSF pressure causes a decrease in cerebral blood flow, resulting in a reflex increase in ophthalmic artery pressure, which in turn leads to venous collapse and capillary rupture. Biportal endoscopy, particularly the interlaminar technique, exposes more of the epidural area and increases the risk of raised epidural pressure. The authors suggested minimising these complications *via* intraoperative control of irrigated fluid pressure, maintaining outflow to limit fluid pressure, and limiting irrigation time. According to Bosscher[7], injecting 10 mL of fluid into the spinal canal could raise epidural pressure to over 100 mm Hg. Moreover, injecting at a

rate exceeding 4 mL per second may produce dangerously high intraspinal and intracranial pressures. The author suggested guidelines for managing epidural fluid, which include injecting the smallest volume necessary at a time and regulating the speed of injection.

The incidence of complications following BESS is 6.7% and dural tears comprise 4.1%[8]. Inadvertent puncture of the dura during surgery causes spikes in intracranial pressure as fluid is irrigated into the subarachnoid space. Multi-layered retinal haemorrhages result from acute generalised extravasation of blood within layers of the posterior segment rather than direct effusion from within the optic nerve sheath. Persistent visual symptoms with postoperative constipation in this patient led to the initial diagnosis of vasalva retinopathy. However, Valsalva retinopathy causes unilateral, solitary, well-circumscribed preretinal haemorrhage and less commonly subretinal haemorrhage[9]. Other causes unrelated to surgery, such as blood dyscrasias, retinal or choroidal vascular diseases, choroidal neovascularisation, polypoidal choroidal vasculopathy (PCV) and retinal artery macroaneurysms (RAM) were ruled out.

IVT aflibercept injection was administered to facilitate resolution of persistent subfoveal haemorrhage and prevent subretinal fibrosis. One month later, VA remained at CF2ft in spite of significant resolution of hyperreflective material on OCT. A thin residual layer of the material overlying the RPE and obscuring the subfoveal EL could explain this. Twelve weeks after second injection, vision recovered with further resolution of residual hyperreflective material and visualisation of EL (Figure 2D). Figure 2A–2D showed OCTs at baseline, weeks 4, 10 and 16.

Prognosis is generally favourable as the haemorrhage usually recovers spontaneously. Hence, most cases have been managed conservatively. Persistent submacular haemorrhage carries a risk of progressive photoreceptor toxicity and formation of subretinal fibrosis, resulting in irreversible visual loss. Anti-vascular endothelial growth factor (anti-VEGF) is an established treatment due to its anti-inflammatory properties, anti-angiogenic effect and ability to reduce vascular permeability. Hence, it facilitates blood reabsorption and may be considered for persistent submacular haemorrhage impacting the fovea[10]. In this case, resolution of subretinal haemorrhage with visualisation of EL on OCT preceded meaningful visual recovery at week 16 following two monthly IVT aflibercept injections. It is most likely that the resolution of haemorrhage would have occurred even without the IVT injections. Predisposing intraoperative risks for this sight-involving complication should be identified with appropriate preoperative counselling for patients undergoing endoscopic spine surgery.

ACKNOWLEDGEMENTS

Conflicts of Interest: Abd Aziz NA, None; **Abdul Ghani NA,** None; **Yip CW,** None; **Mohamed SO,** None.

REFERENCES

1 Sperber J, Owolo E, Zachem TJ, *et al*. Perioperative blindness in spine surgery: a scoping literature review. *J Clin Med* 2024;13(4):1051.

2 Li YS, Chen CM, Hsu CJ, *et al*. Complications of unilateral biportal endoscopic lumbar discectomy: a systematic review. *World Neurosurg* 2022;168:359-368.e2.

3 Moschos MM, Rouvas A, Papaspirou A, *et al*. Acute visual loss and intraocular hemorrhages associated with endoscopic spinal surgery. *Clin Ophthalmol* 2008;2(4):937-939.

4 Dell'Arti L, Barteselli G, Pinna V, *et al*. Sudden occurrence of Roth spots and retinal hemorrhages following endoscopic adhesiolysis: an SD-OCT evaluation. *Eur J Ophthalmol* 2015;26(1):e11-3.

5 Lee KH, Kim GL, Park J, *et al*. Retinal hemorrhage and transient consciousness disturbance after biportal endoscopic lumbar discectomy: a case report and literature review. *J Orthop Sci* 2023;28(6):1450-1455.

6 Kord Valeshabad A, Francis AW, Setlur V, *et al*. Hemorrhagic retinopathy after spondylosis surgery and seizure. *Optom Vis Sci* 2015;92(8):e190-e193.

7 Bosscher H. Pressure-volume relationships in the spinal canal and potential neurological complications after epidural fluid injections. *Front Pain Res* (*Lausanne*) 2022;3:884277.

8 Lin GX, Huang P, Kotheeranurak V, *et al*. A systematic review of unilateral biportal endoscopic spinal surgery: preliminary clinical results and complications. *World Neurosurg* 2019;125:425-432.

9 Conci L, Pereira E, Navajas S, *et al*. Valsalva retinopathy presenting as subretinal hemorrhage. *Case Rep Ophthalmol Med* 2024;2024:4865222.

10 Casini G, Loiudice P, Menchini M, *et al*. Traumatic submacular hemorrhage: available treatment options and synthesis of the literature. *Int J Retina Vitreous* 2019;5:48.