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CASE REPORT

Lens-induced Glaucoma, a Collateral Damage during COVID-19 Pandemic

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ABSTRAK

Katarak ialah penyebab utama kebutaan yang boleh dielakkan di dunia. Jika tidak dirawat, ia boleh mengakibatkan komplikasi seperti glaukoma dan kehilangan penglihatan kekal. Pada tahun 2020, World Health Organisation (WHO) telah mengisytiharkan wabak COVID-19 sebagai darurat kesihatan global. Akibat perintah kawalan pergerakan, rawatan pesakit bagi penyakit bukan-COVID-19 dikurangkan, tarikh temujanji dilanjutkan atau ditangguh dan pesakit-pesakit perlu menjalani ujian saringan COVID-19 sebelum menerima rawatan. Kajian ini menunjukkan kesan sampingan penangguhan tarikh temujanji pesakit disebabkan pandemik COVID-19. Pesakit lelaki berumur 70 tahun dengan darah tinggi datang dengan aduan mata kanannya sakit dan merah selama sebulan. Penglihatannya semakin berkurangan selama setahun tetapi beliau menangguhkan rawatan disebabkan pandemik. Pemeriksaan fizikal menunjukkan ketajaman penglihatan bagi mata kanan (RE) hanya pergerakan tangan manakala mata kiri (LE) adalah 6/12 (ph6/12) dan penglihatan jarak dekat N5. Didapati anak mata kanan menunjukkan "relative afferent pupillary defect". Tekanan intraokular (IOP) RE adalah 54 mmHg dan bagi LE adalah 16 mmHg. Diperhatikan juga kemerahan konjunktiva RE dengan kekaburan kanta kornea. "Anterior chamber" didapati sempit dengan kehadiran sel sebanyak 3+, katarak putih dengan nukleus tenggelam. "Phacodonesis" juga dilihat. Hasil diagnosis ialah "lens induced" glaukoma disebabkan oleh katarak matang. Untuk pengurangan IOP dengan segera, ubat topikal dan sistemik dimulakan. Laporan ini menekankan komplikasi kehadiran lewat pesakit dengan katarak matang semasa pandemik COVID-19. Pendidikan kesihatan serta langkah-langkah untuk meningkatkan kesedaran di kalangan pesakit mengenai komplikasi katarak adalah penting. Pesakit patut diingatkan mengenai gejala glaukoma yang disebabkan oleh kanta katarak sekiranya temujanji ditukar atau dilewatkan.

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Kata kunci: COVID-19, glaukoma sudut terbuka, katarak

ABSTRACT

Cataract if left untreated, can lead to complications such as lens induced glaucoma and permanent visual loss. The COVID-19 outbreak resulted in movement control orders causing closure and reduction of non-COVID hospital services resulting delayed appointment dates. This study described the side effects of delayed patient appointments due to COVID-19 pandemic. A 70-year-old man presented with right eye (RE) pain and redness. There was gradual reduction in RE vision over the last year but treatment was delayed due to pandemic. In examination, visual acuity on his RE was hand movement and left eye (LE) was 6/12 (ph6/12) and near vision of N5. The right pupil was mid-dilated, reacting sluggishly with presence of relative afferent pupillary defect. Intraocular pressure (IOP) on the RE was 54 mmHg and LE was 16 mmHg. Circumciliary injection of right conjunctiva with central corneal haziness was seen. The anterior chamber was deep with the presence of 3+ cells with whitish lens material at the pupillary axis. A Morgagnian cataract with phacodonesis was present. A diagnosis of lens induced glaucoma was made. Immediate reduction of IOP included topical and systemic medication and pain relief were instituted. Intracapsular cataract extraction with anterior vitrectomy and surgical peripheral iridectomy was performed. This highlights the late presentation of a patient with mature cataract during the COVID-19 pandemic. Patient awareness and education are essential in recognising the complications of mature cataract if it is presented later. A reminder of signs and symptoms of lens induced glaucoma should be conveyed to patient when appointment is delayed.

Keywords: cataract, COVID-19, open angle glaucoma

INTRODUCTION

Cataract, is typically presented with gradual progression, painless blurring of vision and it is the clouding of the natural intraocular lens (Feldman et al. 2020; World Health Organisation 2021). In 2020, the World Health Organisation (WHO) reported that cataract contributes to 65.2 million of people and is predominantly found in the low- and middle-income countries (Shah et al. 2011). In Malaysia, data collected from the National Cataract Surgery Registry showed an estimation of 55,687 surgeries were performed in 2018 (Salowi et al. 2018).

In January 2020, WHO declared COVID-19 outbreak as a global health emergency. Shortly after, the Malaysian government enforced the movement control order (MCO) which led to closure and reduction of non-COVID hospital services causing delayed appointment dates and required COVID-19 screening

before medical procedures. The ophthalmology subspecialty was one of the most adversely affected during the pandemic as the majority of cases requiring frequent follow-up are elective conditions (Agarwal et al. 2020; Savastano et al. 2021).

Patients, are typically unaware of the onset of their cataract due to its slow progressive maturation causing subtle decreases in vision initially. This condition exacerbates by the MCO and led to patients presenting their diagnosis later due to delayed appointments and the fear of contracting COVID-19. The sequelae of untreated cataract or delayed presentation may result in lens induced glaucoma leading to irreversible blindness (Azhany et al. 2013; Shah et al. 2011).

Lens induced glaucoma is secondary glaucoma in which the crystalline lens is involved in the mechanism of increased intraocular pressure (IOP). They can present with open or closed anterior chamber (AC) angles which the former consists of phacomorphic and ectopia lentis, whilst the latter comprises phacolytic, lens particle and phacoantigenic glaucoma (Aref et al. 2020).

This case report illustrates the presentation of the open angle variants of lens induced glaucoma, the importance of early surgical intervention and prompt IOP reduction in this type of cataract patients as well as the impact of delayed patient appointments due to COVID-19 pandemic.

CASE REPORT

A 70-year-old man with an underlying history of hypertension, presented to the Eye Clinic, Hospital Canselor Tuanku Muhriz (HCTM) with one-month history of right eye (RE) pain, redness and tearing. Prior to presentation, he complained of a progressive blurring of vision in his RE for a year but had delayed in seeking medical attention due to the pandemic. The eye pain was intermittent, usually lasting for an hour, worse at night and relieved by paracetamol and rest. There were no specific aggravating factors. Two weeks prior to presentation, the episodes of pain became more frequent, longer in duration and started to radiate posteriorly to the right occipital region. The latter pain was associated with haloes. The affected eye had progressive poor vision for the past ten years. Prior to that, he claimed that the right vision was good. He denied any trauma to the affected eye. He was an army retiree and had previously handled guns during his employment.

He initially presented to a private Ophthalmologist and was told to have a raised IOP. He was given oral Diamox 500 mg stat with Gutt Tafluprost and Gutt Simbrinza. As the IOP reduced to 30 mmHg and his symptoms significantly reduced, he was discharged with Gutt Tafluprost once a day and Gutt Simbrinza twice a day. During follow-up visit five days later, he was symptomatic with an IOP of 60 mmHg. He was subsequently referred to our eye clinic for further management. On ocular examination, visual acuity (VA) of the RE was hand movement and left eye (LE) was 6/12 ph 6/9 with near

vision of N5. The right pupil was mid dilated (5 mm wide), reacting sluggishly with presence of relative afferent pupillary defect (RAPD). The IOP on the RE was 54 mmHg and LE was 16 mmHg. The RE showed a circumciliary injected conjunctiva with central corneal haziness and bedewing. The AC was deep with the presence of 3+ cells consisting predominantly of white cells. Whitish lens material was seen in the AC at the pupillary axis, however, there was no hypopyon. There was a Morgagnian cataract with phacodonesis. There was no obvious anterior capsule breach. Gonioscopy showed a Scheie AC angle classification of grade IV in the nasal and temporal quadrants but hazy views in the superior and inferior quadrants. There was no lens matter or peripheral anterior synechiae seen. The LE examination was unremarkable except for the presence of nuclear sclerotic cataract of 2+. B scan of the RE showed presence of posterior vitreous detachment with a flat retina. A diagnosis of phacolytic glaucoma was made.

He was admitted to our ward on the same day and given intravenous Diamox 500 mg stat on top of the maximum topical anti-glaucoma medications to control his IOP. He was also given gutt Predforte acetate 1% every 2 hours to control the inflammation and gutt atropine 1% three times a day to reduce ciliary spasm and ocular pain. However, the IOP was still uncontrolled. Subsequently, he was given intravenous Mannitol 20% 250 mls run over 45 minutes to further reduce his IOP and oral Diamox 250 mg four times a day. The IOP maintained around 28 mmHg while awaiting the inflammation to reduce before performing RE cataract surgery.

He underwent an intracapsular cataract extraction (ICCE) with anterior vitrectomy and surgical peripheral iridectomy under local anaesthesia. Intraoperatively, the anterior capsule was fibrotic and breached at 4 o'clock position. Zonules were weak leading to 270 degrees of zonular dialysis complicated with vitreous prolapse. As he had severe inflammation and visual prognosis was guarded due to long standing high IOP, he was left aphakic. Post-operatively, symptoms were markedly reduced and he was comfortable. His RE vision remained hand movement (HM) but IOP reduced to 18 mmHg. Fundus examination showed features of decompression retinopathy which included a hyperemic optic disc with multiple dot and blot haemorrhages around the vessel arcades. He was prescribed gutt Pred forte 1% hourly, gutt Ciprofloxacin 0.3% every 2 hours, gutt Atropine three times daily and ointment dexamethasone/neomycin at night.

Postoperatively, he had severe AC inflammation and was commenced on oral prednisolone 40 mg for the inflammation and omeprazole for gastric protection. He was prescribed gutt Sodium chloride 3% four times a day and gutt Nepafenac suspension 0.1% thrice daily to reduce the corneal and macular oedema respectively. He was counselled for a secondary intraocular lens implant several months

later but declined, and opted to remain aphakic. He defaulted subsequent follow-up.

DISCUSSION

In the open angle variant of lens induced glaucoma, the trabecular meshwork (TM) can be blocked by several mechanisms; (i) leakage of lens proteins through an intact, permeable lens capsule (phacolytic); (ii) lens material in the presence of a breached capsule (lens particle); or (iii) inflammatory cells caused by an abnormal immune response to previous exposure to lens proteins (phacoantigenic) (Laurenti & Salim 2016).

Phacoantigenic glaucoma is a granulomatous inflammatory reaction directed against own lens antigens, typically occurrs 1 to 2 weeks post-surgery in which keratic precipitates (KPs), AC flare, posterior synechiae and presence of lens material in the AC (Laurenti & Salim 2016). Diagnostic findings in phacolytic glaucoma are the presence of white particles in the AC with KPs and a mature cataract with an intact lens capsule. Lens particle glaucoma, in contrast to phacolytic glaucoma, is due to the breach of the anterior capsule. Lens particles are usually encapsulated, leaking into the AC and block the TM. Typically, a history of trauma or surgery precedes a delayed presentation. There is presence of cortical white matter, with capsule breach and AC flare reaction (Aref et al. 2020; Azhany et al. 2013; Laurenti & Salim 2016).

However, in our case study, no anterior capsule breach was noted on initial presentation. Intraoperatively, there was wrinkling and fibrosis of the anterior capsule with a small capsular breach. The breach was obscured by the wrinkled, fibrotic capsule and overlying lens matter and was only visible upon viscodilation. This capsular breach, cataract and zonular dialysis could have been caused by trauma given the patient's long history of gun handling on his right side.

Via this small outlet, lens particles from the mature cataract may have leaked into the AC, gradually obstructing the angle leading to subacute presentation of lens particle glaucoma. Regardless, without a definitive history of trauma, a specific diagnosis and distinction is difficult to ascertain in this case.

Given the condition mentioned above, our patient was given intravenous Acetazolamide followed by Mannitol 20%. Acetazolamide is a reversible carbonic anhydrase inhibitor which reduces the production of aqueous humour (Shah & Meyer 2022). Mannitol, a hyperosmotic agent, dehydrates the vitreous humour by increasing the tonicity of the blood plasma (Mesghali et al. 2019). The water reduction in the vitreous humour reduces the mass effect, and thus, reduces the IOP. Latanoprost, Timolol maleate and Brimonidine tartrate are prostaglandin analogues, beta blockers and alpha 2 receptor agonists respectively (Shah & Meyer 2022). These medications reduce the IOP by increasing uveoscleral outflow and reducing aqueous humour production. Prednisolone acetate 1% was given to

reduce the intraocular inflammation prior to op, and atropine sulfate 1% to induce cycloplegia, preventing peripheral anterior synechiae formation and pain relief.

Despite being given maximum antiglaucoma medications, his IOP did not reduce. This could have been due to obstruction of the trabecular meshwork by the lens particles and intense inflammation secondary to the lens particles in the AC.

The definitive treatment for lens induced glaucoma is cataract extraction (Aref et al. 2020; Shah & Meyer 2022). The type of surgery conducted is dependent on surgeon experience and the complexity of the case. Phacoemulsification, extracapsular cataract extraction (ECCE), ICCE and small incision cataract surgery can be employed (Shah & Meyer 2022).

Both ECCE and ICCE involve a large limbal incision wound, however in the latter, the lens and its capsule are removed in one piece. The ECCE involves another incision on the lens capsule anteriorly, enabling the removal of cataract, leaving an intact capsular bag for the insertion of the new intraocular lens. We performed an ICCE for our patient which was unfortunately complicated by zonulysis and vitreous loss. Vitreous prolapsed into the AC and an anterior vitrectomy with a surgical peripheral iridectomy was performed to prevent pupillary block (Clark et al. 2015). As he had a guarded visual prognosis, he was left aphakic.

Shingleton et al. (2003) found that 60% of subjects with phacodonesis had vitreous loss during surgery. Another study reported a higher incidence of capsular complications intraoperatively if there was phacodonesis (Artzén et al. 2009). Liu et al. (2011) reported a higher incidence of intraoperative zonular dialysis if phacodonesis was severe. Intraoperatively, an ECCE exerts more pressure on the zonules compared to phacoemulsification. With the presence of a mature cataract, the pressure applied is increased due to the complexity of the operation (Liu et al. 2011).

Cataract surgery in lens induced glaucoma poses several challenges. The risk of expulsive haemorrhage is severely increased due to the high IOP. The nucleus was hard and presence of zonular dialysis with an increased incidence of iris prolapse was seen (Venkatesh et al. 2007). With late presentation of mature cataracts, phacoemulsification is difficult as compromised zonules provide minimal stability to support the extraction of a hardened nucleus. This can result in an increased risk of corneal endothelial damage and posterior capsule rupture (Venkatesh et al. 2007). Our patient developed corneal oedema postoperatively in an immediate response and cystoid macular oedema a week later.

During the nationwide lockdown, all hospitals across the country cancelled routine healthcare services and patients were advised to avoid hospital visits unless it is critical (Ting et al. 2020). Studies have shown that ophthalmology surgical and clinical services reduced by more than 90% during the pandemic (Babu et al. 2020; Savastano et al. 2021; Ting et al. 2020).

To overcome this, strategies such as telemedicine and alterations of face-to-face encounters were adopted (Lin et al. 2021; Ting et al. 2020). Although telemedicine was not adopted in our hospital, several other safety measures were implemented. Social distancing was practiced and sanitisation of instruments were conducted between patients. Appointments were staggered and patients who had scheduled visits were screened via a telephone call the day prior to their appointments. Triage counters were set up at hospital entrances to ensure patients were asymptomatic. When an ocular emergency required surgery, cases were prioritised according to severity and precautions such as patient screening were done preoperatively and personal protective equipment was donned intraoperatively.

This pandemic has served as a lesson to adopt digitalised healthcare systems incorporating telemedicine with or without the assistance of artificial intelligence (AI) as it can aid in reducing hospital visits and help to prioritise cases which require urgent referral to a tertiary care centre (Ting et al. 2019; Ting et al. 2020).

CONCLUSION

Cataract causes reversible blindness and is easily managed, but if it is left untreated, it can cause devastating vision loss. This highlights the late presentation of a patient with mature cataract during the COVID-19 pandemic. Patient awareness and education is essential in recognising the complications of mature cataract when it is presented late. A reminder of signs and symptoms of lens induced glaucoma should be conveyed when postponement of appointments is made.

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