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Case report

## Choroidal detachment-induced secondary angle-closure after trabeculectomy in patient with ocular venous congestion: A case report

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## ABSTRACT

**Purpose:** To report a particular circumstance that led to the abnormal complication of choroidal detachment (CD)-induced secondary angle-closure after trabeculectomy with mitomycin C (MMC).

**Observations:** An 82-year-old Japanese male patient with underlying chronic obstructive pulmonary disease and suspicion of ocular venous congestion in both eyes whom diagnosed as primary open-angle glaucoma with uncontrolled intraocular pressure (IOP) of his left eye then underwent an uneventful trabeculectomy with MMC. After the surgery, his left eye had high IOP with a shallow anterior chamber (A/C) but the bleb was hyper-filtration. The high CD was found by B-scan ultrasonography behind the iris and after conservative treatment, the CD was improved, A/C was deepened, and IOP was lower to 16 mmHg.

**Conclusion and Importance:** CD-induced secondary angle-closure after trabeculectomy with MMC is a complication to be considered in patients with shallow A/C and high IOP. Fundus examination should be done to rule out this condition before any aggressive treatment as CD can resolve spontaneously with time. Clinicians should be aware of this condition especially in patients with any signs of ocular venous congestion as there have been few reports mentioned about the complication in the patients.

## 1. Introduction

Choroidal detachment (CD) is a complication which usually occurs after glaucoma filtering surgeries especially in cases with postoperative hypotony, ranged from 4 to 55%.<sup>1-6</sup> However, there were several reports<sup>7,8</sup> described patients with normal or high intraocular pressure (IOP) from secondary angle-closure caused by posterior pushing to the iris by to the CD itself. In this report, we once more provided the information about the case with particular circumstance leading to the diagnosis of CD-induced secondary angle-closure after trabeculectomy.

## 2. Case Report

An 82-year-old Japanese male patient diagnosed as primary open-

angle glaucoma in both eyes following-up at Department of Ophthalmology, Kyoto Prefectural University of Medicine (Kyoto, Japan). He had the underlying diseases of chronic obstructive pulmonary disease (COPD), benign prostatic hypertrophy, colon polyp, and duodenal cancer. He had his right eye done with an uneventful gonioscopy-assisted transluminal trabeculectomy and phacoemulsification with intraocular lens implantation (PEA+IOL) then an uneventful trabeculectomy with mitomycin C (MMC) and his left eye done with an uneventful PEA+IOL.

Before trabeculectomy, his best-corrected visual acuity (BCVA) was 20/22 ( $-0.25-2.00 \times 100^\circ$ , axial length (AL) 24.1mm) in the right eye and 20/66 ( $-0.75-1.5 \times 110^\circ$ , AL 23.92mm) in the left. The IOP was 20 mmHg in the right eye and 36 mmHg in the left. The Slit-lamp examination had shown abnormally dilated and tortuous conjunctival vessels of both eyes in 2017, 1 year prior to surgery which could not be seen before (Fig. 1) so ocular venous congestion was suspected but the magnetic resonance imaging and angiography of brain and orbit did not indicate any fistula, vascular malformation, or mass. Gonioscopy was

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wide open without any blood in Schlemm's canal in both eyes. A Cup-to-disc ratio was 0.45 right eye and 0.3 left eye. Other parts of the eyes were unremarkable. 30-2 visual field (Humphrey Field Analyser<sup>®</sup>, Carl Zeiss Meditec Japan Co Ltd, Tokyo, Japan) was  $-24.32\text{dB}$  right eye and  $-5.42\text{dB}$  left eye.

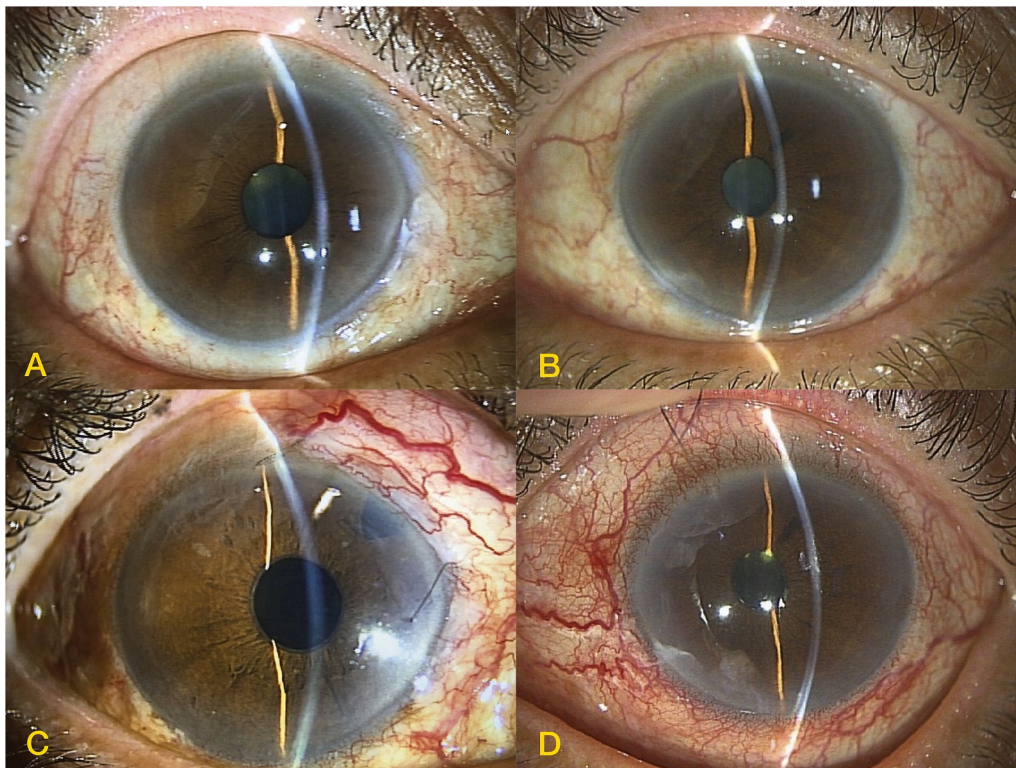
Preoperative antiglaucoma medications of the left eye were brimonidine tartrate (Aiphagan<sup>®</sup> Ophthalmic Solution 0.1%, Senju Pharmaceutical Co Ltd, Osaka, Japan), Latanoprost (Xalatan<sup>®</sup> Eye Drop 0.005%, Pfizer Pharmaceuticals Inc, Tokyo, Japan), and Dorzolamide hydrochloride (Trusopt<sup>®</sup> Ophthalmic Solution 1%, Santen Pharmaceutical Co Ltd, Osaka, Japan). Trabeculectomy with MMC was done in the left eye without any intraoperative complication. Postoperative medications were levofloxacin hydrate (Cravit<sup>®</sup> Ophthalmic Solution 1.5%, Santen Pharmaceutical Co Ltd, Osaka, Japan) four times a day and betamethasone sodium phosphate (Rinderon<sup>®</sup> ophthalmic solution 0.1%, Shionogi, Osaka, Japan) six times a day.

On first postoperative day (POD), the left eye's VA was hand motion without any severe pain could be observed throughout the follow-up, the IOP was 26 mmHg (17 mmHg after massage), anterior chamber (A/C) was shallow grade 1 with patent peripheral iridectomy and hyperfiltering bleb, and hyphema was 50% of A/C diameter (Fig. 2). Aqueous humor hyperfiltration with severe A/C bleeding and inflammation were considered, therefore atropine hydrate sulphate (Atropine<sup>®</sup> Ophthalmic Solution 1%, Nitten Pharmaceutical Co Ltd, Aichi, Japan) once daily was added to prevent posterior synechiae and move the lens-iris diaphragm posteriorly. POD 4, VA of the left eye was improved to counting fingers at 1 foot, the IOP was 25 mmHg (18 mmHg after massage), A/C was deeper but still shallow grade 1 with hyperfiltering bleb, and hyphema was improved (Fig. 3). Despite the clinical improvement, the IOP was still high and posterior segment of the eye could not be clearly seen, B-scan ultrasonography (Echoscan US-4000<sup>®</sup>, Nidek Co Ltd, Aichi, Japan) was done and found that high CD was

behind the iris corresponding to the shallow area of A/C (Fig. 3). The treatment remained unchanged because we believed that the sustained high IOP may have been caused by secondary angle-closure from CD and it might resolve spontaneously with the time. POD 8, VA was 20/50 with the hyphema almost all gone but the IOP was 24 mmHg, A/C was still shallow grade 1, and peripheral anterior synechiae (PAS) was observed at the temporal side. B-scan was repeated, the CD was still high with an expansion of nearly  $360^\circ$  behind the iris (Fig. 4). Previous treatment was continued. After that, VA was stable, the IOP was maintained around 20 mmHg without any antiglaucoma medication, A/C was getting deeper without iridocorneal touch, and CD was gradually lower as days went by. 4 months after the operation, the left eye's VA was stable at 20/50, IOP was 16 mmHg, A/C was deep, and shallow CD could be observed at only a temporal peripheral arc of the fundus by ultra-widefield retinal imaging camera (Optos Daytona<sup>®</sup>, Nikon Healthcare Inc, Tokyo, Japan) (Fig. 5).

### 3. Discussion

The differential diagnosis of the shallow anterior chamber with high IOP after glaucoma filtering surgeries consists of pupillary block, suprachoroidal hemorrhage, and malignant glaucoma.<sup>9</sup> Nevertheless, there are some situations that might be overlooked because they are rare occurrences as seen in our report. We had been aware of the risk of uveal effusion or CD in our patient since we found a sign of ocular venous congestion in both of the patient's eyes because there were reports about this kind of incidence previously.<sup>10,11</sup> Moreover, our patient had an underlying disease of COPD that is associated with pulmonary hypertension<sup>12</sup> followed by higher episcleral venous pressure<sup>13</sup> and CD.<sup>14,15</sup> CD did occur postoperatively in our case which was diagnosed by B-scan, although not annular as in the previous reports<sup>7,8</sup> but also subsequently brought about to secondary angle-closure and high IOP. We



**Fig. 1.** Ocular signs suggesting acquired ocular venous congestion Upper panel - slit-lamp photography taken in 2016 reveals normal conjunctival vessels of A) the right eye and B) the left eye Lower panel - slit-lamp photography taken in 2017 reveals dilated and tortuous conjunctival vessels of C) the right eye and D) the left eye.

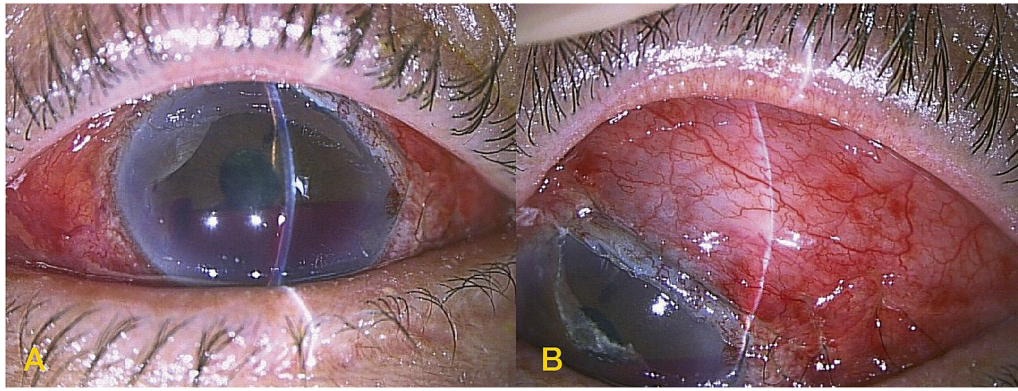


Fig. 2. Left eye, postoperative day 1. A) Hyphema 50% with a shallow superior aspect of the anterior chamber. B) Broad and medium to high filtering bleb.

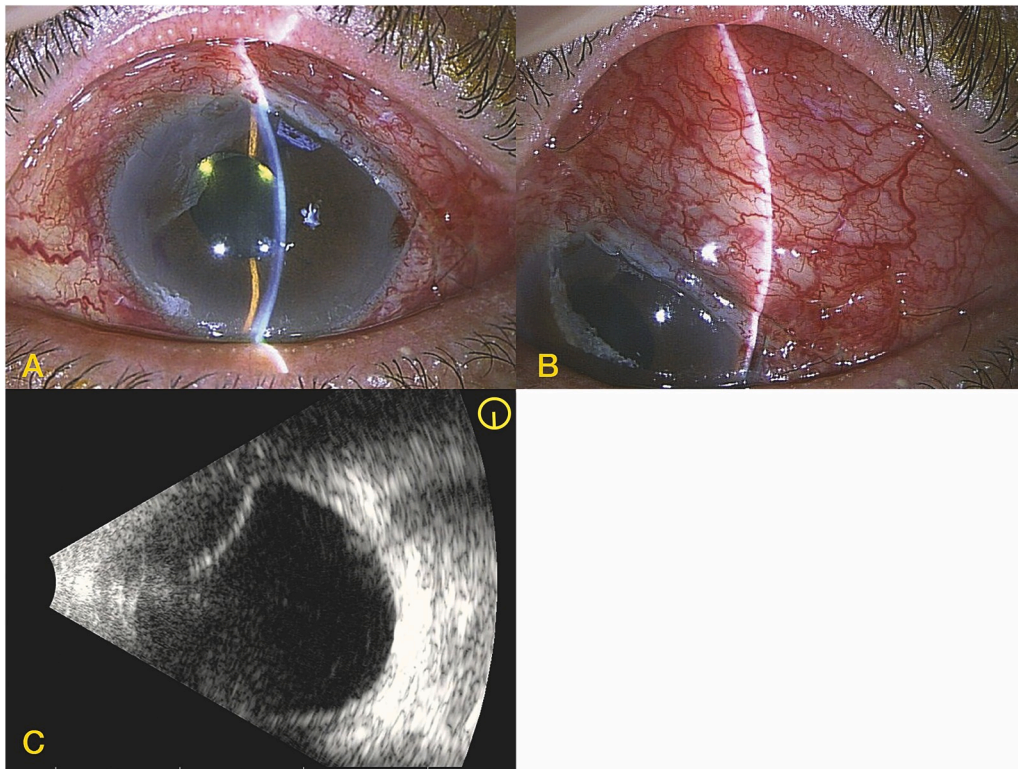
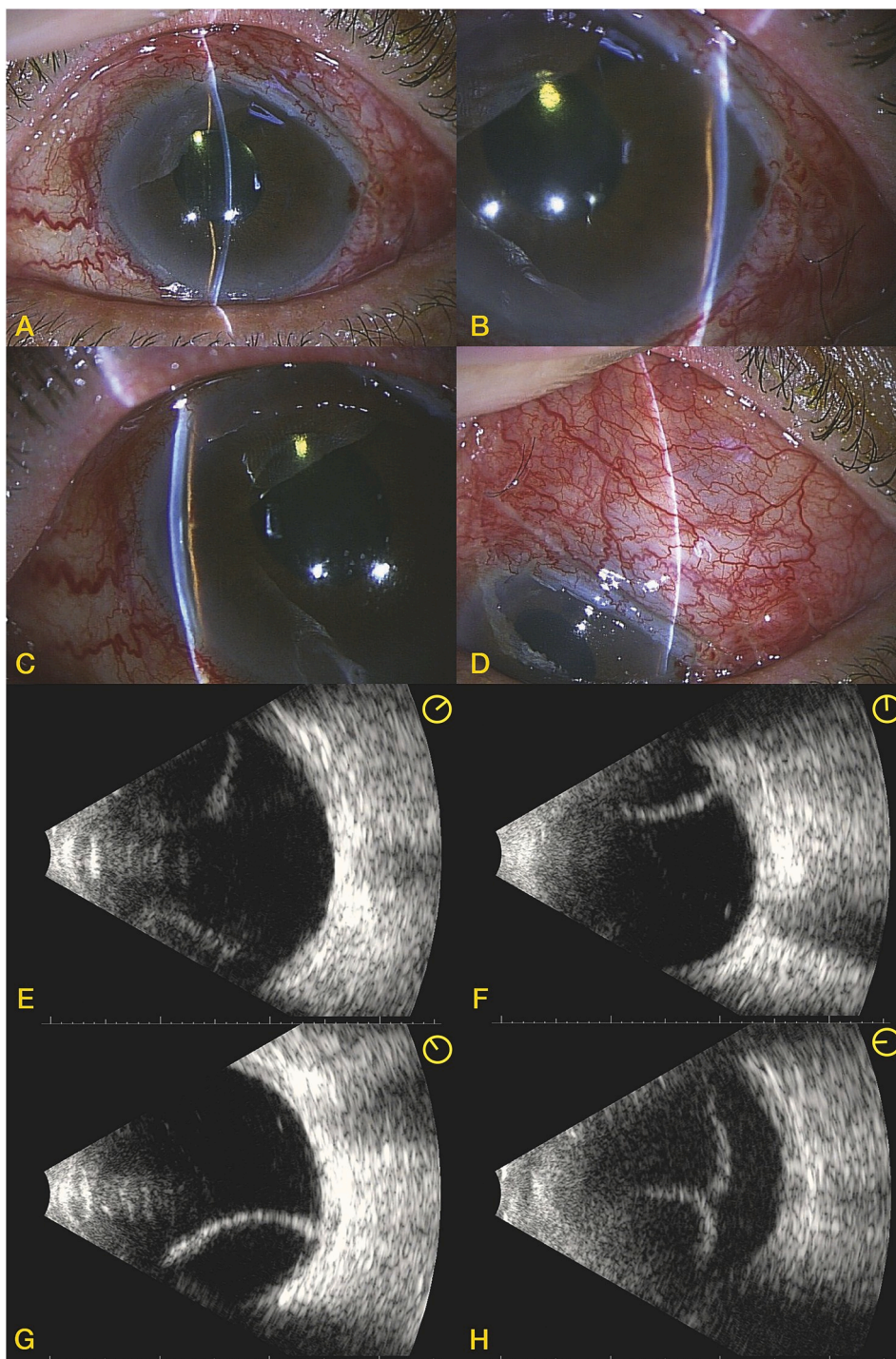


Fig. 3. Left eye, postoperative day 4, A) Hyphema almost disappeared but the anterior chamber was still generalized shallow. B) Broad and medium to high filtering bleb. C) B-scan ultrasonography of the left eye on postoperative day 4 showed dome-shaped thick membranous-like lesion contained hypoechoic content with rapid after movement at the superior part and another shallow likewise lesion at the inferior part of the eye resembled choroidal detachment.

chose a medical treatment and observation in our patient. Although surgical treatment can shorten the time to resolution in CD,<sup>7</sup> we chose medical management and observation in our patient to reduce morbidity and avoid sight-threatening complications seen in eyes with the venous congestion undergoing surgical intervention and medically, cycloplegic agents could provide anterior chamber depth maintaining<sup>16,17</sup> and steroids could raise the IOP by improving ciliary shutdown and fluid leakage caused by inflammatory process<sup>18</sup> and changing the extracellular matrix components in the trabecular meshwork.<sup>19</sup> After CD was improved, A/C was deeper and IOP was lower in the meantime. This could assume that CD-induced secondary angle-closure after trabeculectomy occurred in this patient because the CD possibly formed after low IOP from aqueous hyperfiltration as we could see from the examination at the area corresponding the shallow A/C and CD itself could block the aqueous outflow through the scleral window of trabeculectomy considering its position in Fig. 4E) and F) then caused the rising of

the IOP subsequently. Eventually with spontaneous recovery of the CD, the IOP went down.

The other plausible mechanism of the patient's clinical was malignant glaucoma occurring after the filtering surgery, however we thought that the symptoms and signs of the patient were not quite relevant to the malignant glaucoma, for example, there was no severe painful or generalized flattening of the A/C so we tended to believe that CD-induced secondary angle-closure was the main mechanism in this case but we could not rule out the possibility of malignant glaucoma occurring at the same time.



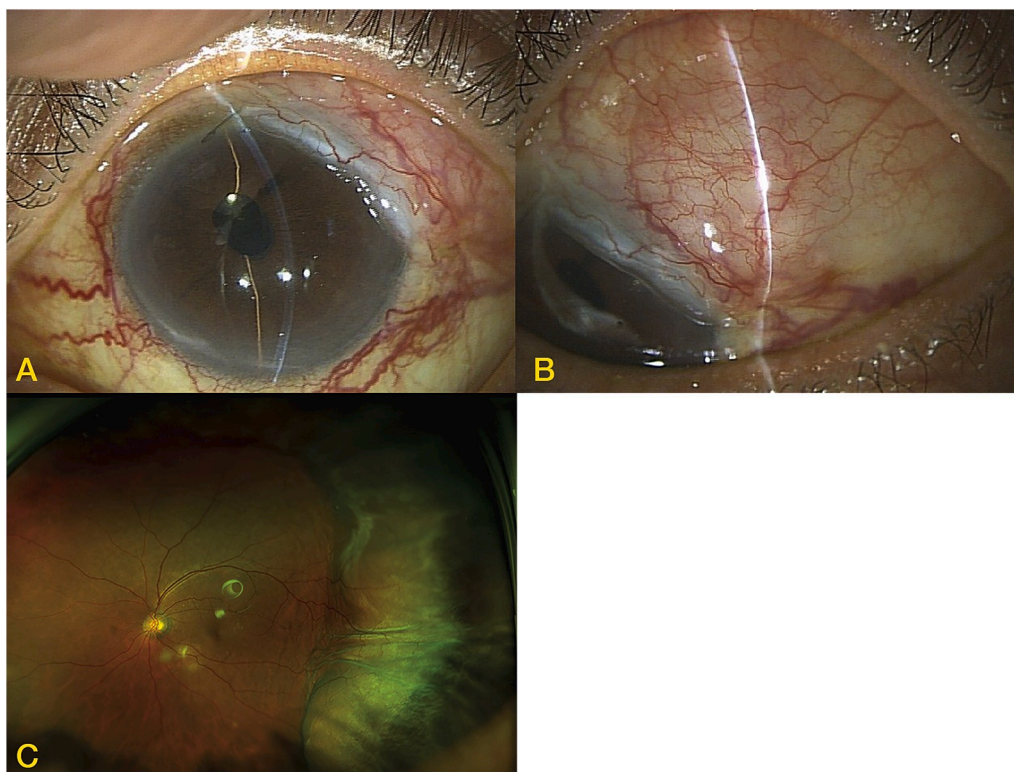
**Fig. 4.** Left eye, postoperative day 8. A) Shallow superior and inferior anterior chamber. B) Shallow temporal anterior chamber. C) Shallow nasal anterior chamber. D) Broad and medium filtering bleb. E) B-scan probe marker at 45°. F) B-scan probe marker at 90°. G) B-scan probe marker at 135°. H) B-scan probe marker at 180°.

#### 4. Conclusions

Thoroughly preoperative patient assessment can make a good preparation for every surgeon to avoid or promptly resolve any expected complications. Postoperative fundus examination should be made either directly or indirectly to confirm and rule out any suspicious conditions. Choroidal detachment-induced secondary angle-closure should be kept in mind in the evaluation of the patients after filtering surgeries that it can probably be the cause of postoperative complications, especially in unusual condition as this report showed.

#### Patient consent

Written consent has been obtained from the patient to report the case and this report has been conducted with the ethical approval from the Institutional Review Board of Kyoto Prefectural University of Medicine, Kyoto, Japan.



**Fig. 5.** Left eye, 4 months after surgery. A) The anterior chamber was deep and conjunctiva was less injected but dilated and tortuous conjunctival vessels could still be detected B) filtering bleb was lower than an early postoperative period C) fundus photo showed shallow choroidal detachment at the temporal peripheral area of the left retina.

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### Intellectual property

We confirm that we have given due consideration to the protection of intellectual property associated with this work and that there are no impediments to publication, including the timing of publication, with respect to intellectual property. In so doing we confirm that we have followed the regulations of our institutions concerning intellectual property.

### Research ethics

We further confirm that any aspect of the work covered in this manuscript that has involved human patients has been conducted with the ethical approval of all relevant bodies and that such approvals are acknowledged within the manuscript.

Written consent to publish potentially identifying information, such as details or the case and photographs, was obtained from the patient(s) or their legal guardian(s).

### Authorship

All listed authors meet the ICMJE criteria.

We attest that all authors contributed significantly to the creation of this manuscript, each having fulfilled criteria as established by the ICMJE.

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No conflict of interest exists.

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### Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.ajoc.2020.100782>.

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