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Case Report
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A Rare Case of Retinal Arterial Microaneurysm: Clinical Features and Diagnostic Insights

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ABSTRACT

Background: In Retinal Arterial Macroaneurysms (RAM), the central retinal artery suffers from acquired focal hypertension. Clinical manifestations of the disease are diverse and easily misdiagnosed. Several imaging modalities may be used in order to confirm the diagnosis of RAM. This article aims to describe the clinical features and method of diagnosis of an uncommon case of retinal artery microaneurysm.
Case report: A 57-year-old woman presented with a progressive loss of vision in her right eye months prior. Visual acuity in the right eye was 0.8 log 13. Upon funduscopic inspection of the right eye, firm exudates with low tortuosity and submacular hemorrhage were observed. The right eye's OCTA revealed a localized expansion and significant constriction with twisted blood vessels on the reverse side of the deformed vessel, while the OCT of the macula revealed submacular hemorrhage. The patient was diagnosed with ruptured retinal Arterial Macroaneurysm or Macular Telangiectasia Type I and Retinopathy Hypertensive Grade II of both eyes, No Diabetic Retinopathy of both eyes with Diabetes Mellitus and Hypertension. The right eye of the patient received concentrated laser photocoagulation and an intravitreal injection of anti-VEGF.
Conclusion: RAM is an acquired vascular disease defined by restricted, fusiform, or saccular dilation in the first three arteries of the main retinal artery. Retinal microaneurysms can be diagnosed with various imaging modalities. Ram may be treated with intravitreal anti-VEGF drugs, combination therapy, or laser photocoagulation.

Keywords: Retinal arterial microaneurysm, clinical characteristic, diagnostic approach, systemic hypertension.

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BACKGROUND

The big retinal arteries dilate roundly or fusiformly in acquired peripheral ocular artery macroaneurysms (RAM), which appear within the first three branches of the main retinal artery. It could have happened at the arteriovenous crossing or bifurcation places along the temporal branches. It stated that RAM may occur in about 1 out of 4500 subjects aged ≥ 40 in

northern China, and about 1 out of 1500 subjects aged ≥ 30 in rural Central India. Earlier studies found that RAM also has a prevalence of 1/9000 in China and is more common in women aged 60 to 80 years. To the best of the author's knowledge, there has been no research on the prevalence of RAM in Indonesia due to the rarity of the case. Because Ram occurs infrequently, the majority of earlier research had retrospective designs and small sample sizes. Since only a small number of people have been described as having certain clinical criteria for RAM, the results vary (Goldhagen and Goldhardt, 2019; Chen et al., 2022; Meng et al., 2022; Xie et al., 2023).

Typically, RAMs are solitary, unilateral finding that are commonly seen in elderly women with long-standing hypertension, arteriosclerosis, and abnormal lipid levels. In rare cases of RAM, 10% of cases manifest bilaterally, and 15-20% of cases with multiple aneurysms occurring in the same eye. RAM can be divided into three types based on its clinical appearance: quiescent, hemorrhagic, and exudative. The silent type is asymptomatic, the hemorrhagic type presents acutely with rapid visual deterioration and multilayered hemorrhage, and the exudative type has a more gradual and sluggish course with lipid buildup around the lesion. Retinal micro aneurysms can also cause intraretinal, subretinal, pre-retinal, and vitreous hemorrhage, vision loss might occur suddenly or gradually if the related bleeding or exudation is inside the macula (Goldhagen and Goldhardt, 2019; Chen et al., 2022; Meng et al., 2022).

The pathophysiology of RAM has been partly understood. Acquired vascular damage is caused by inflexible, dilated arterioles with defective vessel walls as a result of structural arterial alterations brought on by hypertension. Moreover, gender and aging are well-known risk factors. The thinning and fibrosis that come with aging reduce the flexibility of the arteries. Female gender is also related to several hormonal and genetic causesthat need further research. Angiotensin II-induced inflammation, changes in pericytes, and dysregulated extracellular matrix turnover are all involved in the etiology of retinal macroaneurysms, which weaken the retinal artery wall. Commonly found in the first three orders of the arterial tree, where the thin, stretched arterial sac is easily ruptured and there is high perfusion pressure, such as at arteriovenous crossings.

In the retina, macroaneurysm generally occurs in the macular or postequatorial regions. Increased or variable blood flow applies more uneven pressure on the lesion, resulting in fusiform and saccular dilatation, which are symptoms of RAM. The inability of the arteries to maintain structure and diminished tolerance to pressure are the causes of RAM symptoms (Erol et al., 2015; Chen et al., 2017, 2022; Liu and Wang, 2023; Song et al., 2023).

The illness presents with a wide range of clinical symptoms that are frequently misinterpreted. Several imaging modalities may be used to help and confirm the diagnosis of RAM. To find and visualize the focal intraretinal hyperreflectivity of retinal exudates and the hyporeflective intraretinal or subretinal fluid, Optical Coherence Tomography (OCT) can be employed. The focal vascular outpouching in a RAM can also be seen with OCT Angiography (OCT-A), which offers a noninvasive, high-resolution substitute for Fundus Fluourescence Angiography (FFA) and Indocyanine Green (ICG) Angiography. The mobility of choroidal and retinal blood flow can be seen by OCTA. It is important for clinician to use caution

while distinguishing retinal aneurysmal alteration from other conditions such diabetic retinopathy, von Hippel-Lindau disease, Coats disease, and macular telangiectasia. As of right now, there are no accepted treatment protocols for RAM. The sole factors influencing RAM treatment and management are its clinical manifestation and any related consequences (Goldhagen and Goldhardt, 2019; Meng et al., 2022; Wang et al., 2022; Song et al., 2023). This case study attempts to clarify the clinical features and method of diagnosis of an uncommon instance of retinal artery microaneurysm.

CASE REPORT

A 57-year-old woman came with a chief complaint of gradual vision loss in theright eye since about 1 month ago. The vision of the right eye appears hazy and worsens slowly. The patient also complained of metamorphopsia, but floaters and photopsia were denied. The patient denied any complaints of recurrent eye redness, sore, itchy or presence of discharge. The patient had never had surgery, trauma, or used spectacles. Additionally, she had a history of systemic illnesses such excessive cholesterol, diabetes mellitus, and hypertension. She had diabetes mellitus for almost 13 years and routinely controlled with medications. There is denial of any prior history of alcohol or tobacco use. There isn't a family history of this complaint.

The general examination revealed a high blood pressure of 174/84 mmHg, which was within normal limits. An ophthalmology examination revealed that the patient was orthogonal in the primary position and that their eyes moved normally in all directions of gaze. Visual acuity in right eye was 0.8 log 13 and left eye was 0.6 log 25, both eyes having normal intraocular pressure.

Anterior segment examination of both eyes was within normal limit. Submacular bleeding was discovered during a funduscopic examination of the right eye, hard exudates with minimal tortuosity and arteriovenous ratio was 1:3, no cotton wool spot. On the left eye showed only hard exudates with minimal tortuosity and arteriovenous ratio was 1:3, no cotton wool spot. The right eye's macula was shown using optical coherence tomography (OCT) to be hyporeflective, with increased reflectivity areas of intraretinal, submacular, and outer retinal structures.

The submacular fluid and disturbed foveal depression suggested a submacular edema or hemorrhage. It also showed that there were an increase in central subfield thickness, volume cube and average cube thickness in right eye macula suggesting a submacular edema. The left eye's macula OCT results were within normal bounds (Figure 1). Optical coherence tomography angiography (OCTA) 6x6 mm of the right eye revealed a locally enlargement and marked dilatation with twisted blood vessels on one side of malformed vessel. There was also increase in hyporeflective area around macula on OCTA map of the righ eye suggesting a submacular edema or hemorrhage. OCTA of the left eye was within normal limit with normal OCTA map (Figure 2).

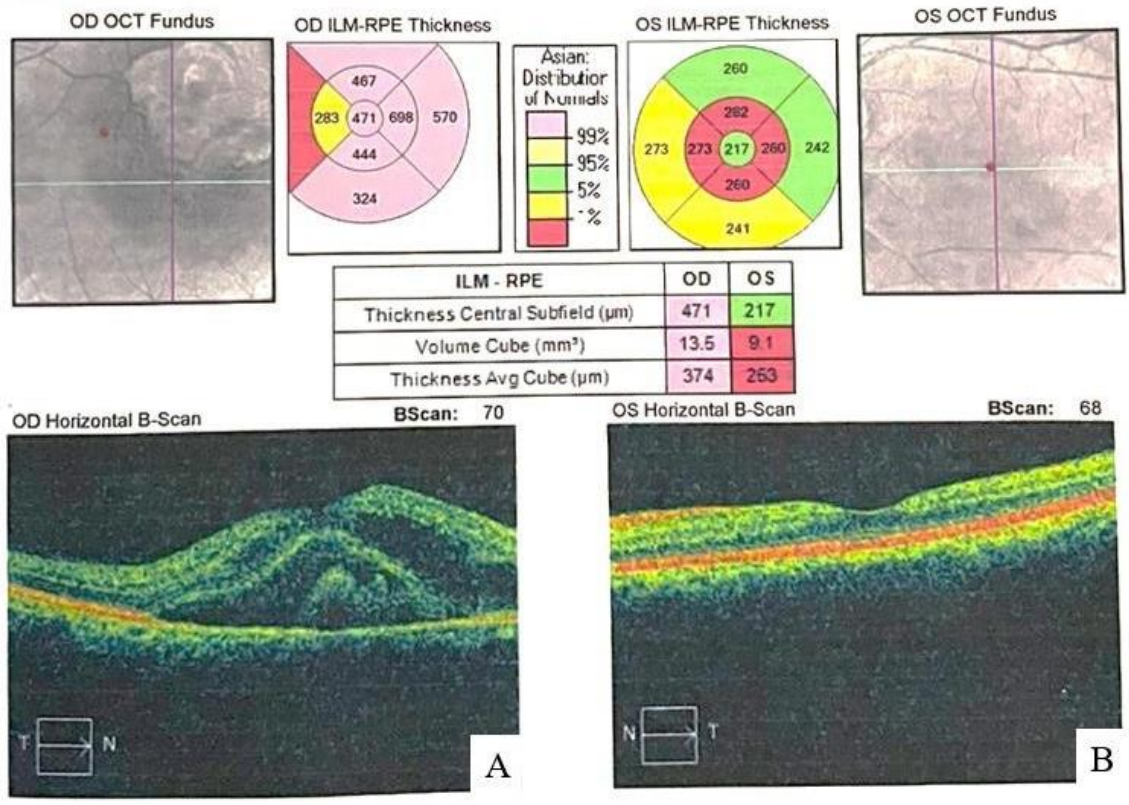

Figure 1. Optical coherence tomography (OCT) of macula of the right eye (A) showed hyporeflective with increased reflectivity area of intraretinal, submacular and outer retinal structures, disrupted foveal depression with submacular fluid suggesting a submacular edema or submacular hemorrhage. OCT of the left eye (B) was within normal limit.

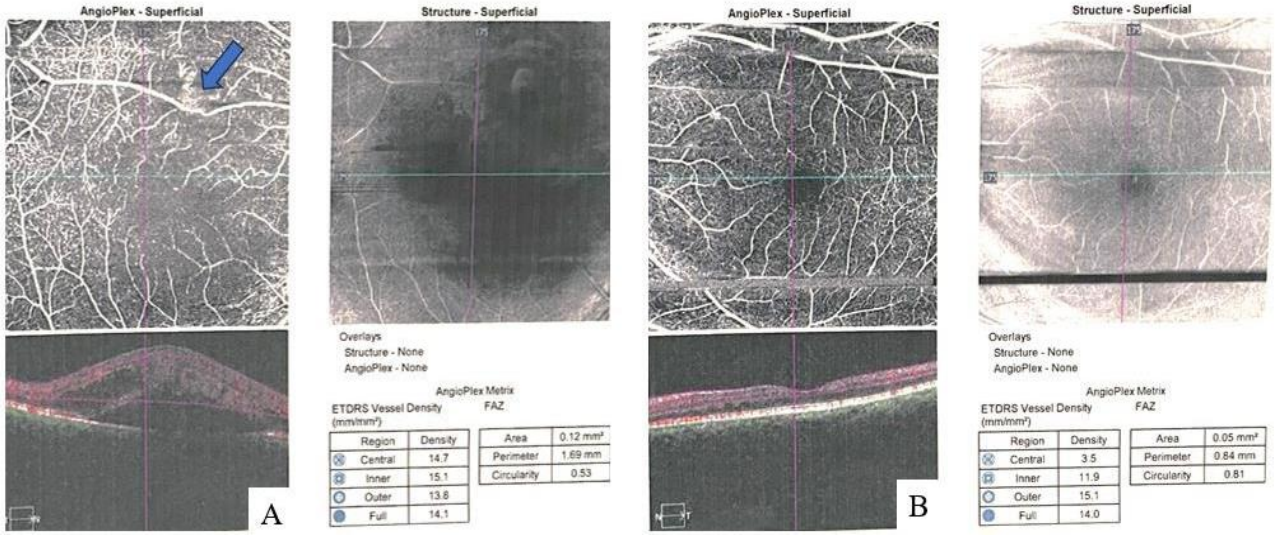

Figure 2. Optical coherence tomography angiography (OCTA) 6x6 mm of the righteye (A) revealed a locally enlargement and marked dilatation with twistedblood vessels on one side of malformed vessel (blue arrow). OCTA of the left eye (B) was within normal limit.

The patient was diagnosed with Submacular Hemorrhage of the right eye suspected caused by Rupture Retinal Arterial Macroaneurysm or Macular Telangiectasia Type I and Retinopathy Hypertensive Grade II of both eyes, No Diabetic Retinopathy of both eyes with Diabetes Mellitus and Hypertension. Two weeks following the intravitreal injection in the right eye, the patient was scheduled for focused laser photocoagulation and an intravitreal injection of anti-VEGF. In order to manage hypertension, diabetes mellitus, and any associated underlying disorders, the patient was also consulted by the internal medicine unit.

Following intravitreal anti-VEGF injection, the right eye of the patient received four daily doses of ofloxacin eyedrop. One week after the intravitreal injection patient came to control and underwent a follow up examination of the right eye. The visual acuity on the right eye was slightly increased with 0.5 log 30 and 0.2 log 45 on the left eye. The right eye's funduscopic examination revealed a small amount of resolving submacular hemorrhage, hard exudates with minimal tortuosity, and an arteriovenous ratio of 1:3, with no cotton wool spot (Figure 3). The OCTA 9x9 mm of the right eye showed a decrease of locally enlarged and dilatation of blood vessels with decrease twisted blood vessels around the malformed vessel. The OCTA map of the right eye showed a decrease in hyporeflective area around macula with a hyperreflective small area suggesting a resolving submacular hemorrhage with fibrosis. OCTA of the left eye was within normal limit with normal OCTA map (Figure 4). Patient was diagnosed with with Resolving Submacular Hemorrhage of the right eye suspected caused by Rupture Retinal Arterial Macroaneurysm or Macular Telangiectasia Type I and Retinopathy Hypertensive Grade II of both eyes, No Diabetic Retinopathy of both eyes with Diabetes Mellitus and Hypertension.

Figure 3. Funduscopic examination of the right eye (A) showed minimal submacularhemorrhage (resolving), hard exudates with minimal tortuosity and arteriovenous ratio was 1:3, with no cotton wool spot. On the left eye (B) showed only hard exudates with minimal tortuosity and arteriovenous ratio was 1:3, no cotton wool spot.

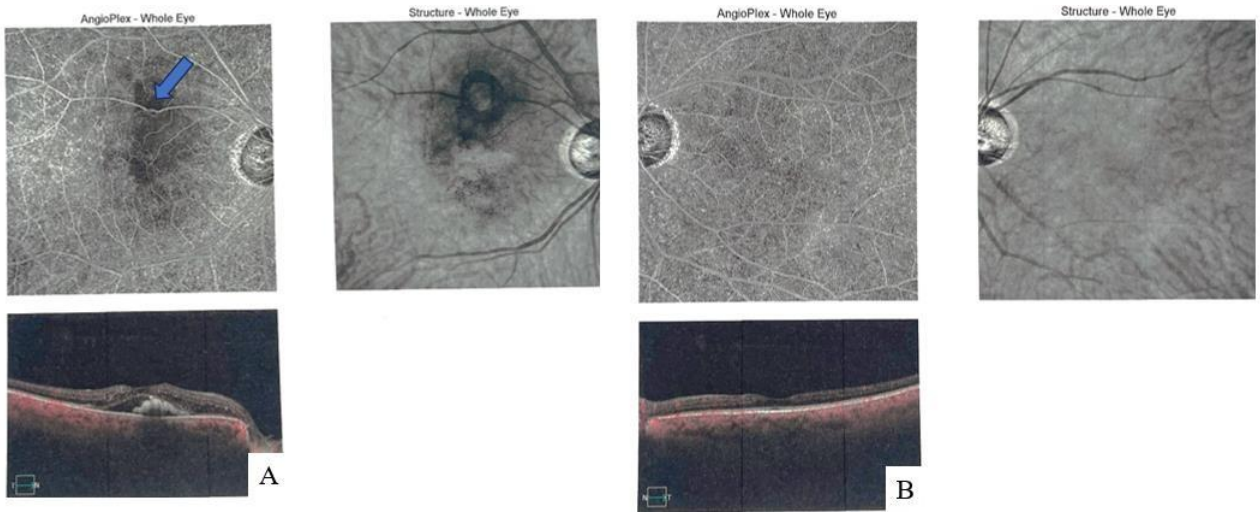

Figure 4. Optical coherence tomography angiography (OCTA) 9x9 mm of the righteye (A) showed a decrease of locally enlarged and dilatation of blood vessels with decrease twisted blood vessels around the malformed vessel (blue arrow). The OCTA map of the right eye also showed a decrease in hyporeflective area around macula with a hyperreflective small area suggesting a resolving or minimal submacular hemorrhage with fibrosis.

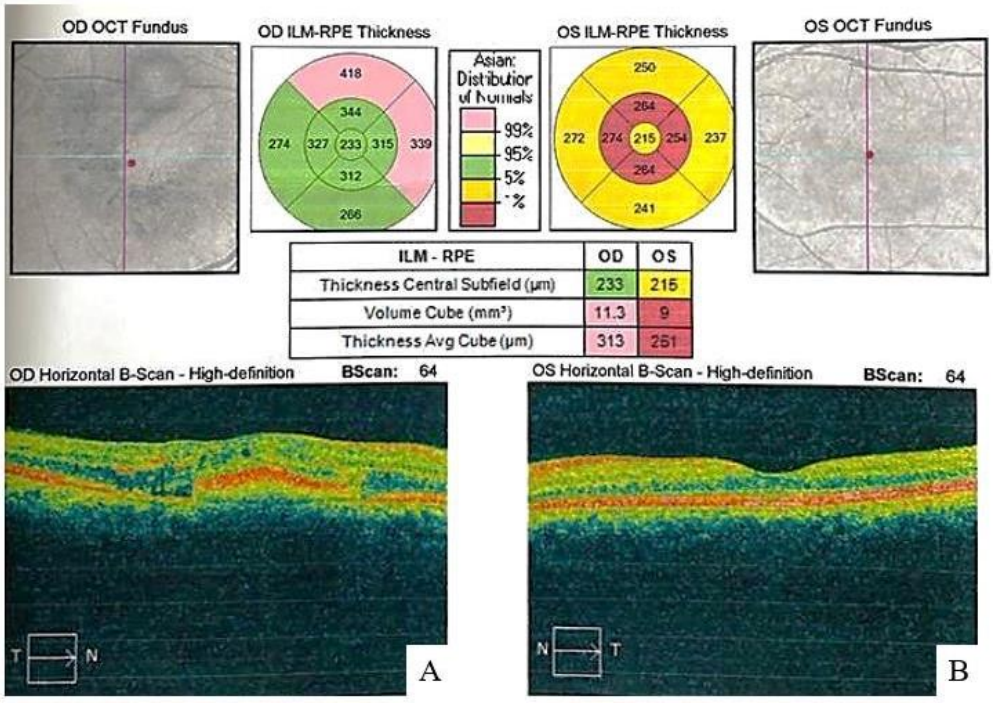

Figure 2.5 Optical coherence tomography (OCT) macula of the right eye (A) showed no hyporeflective area of intraretinal, submacular and outer retinal structures with disrupted foveal depression and hyperreflective area of submacular suggesting a resolving submacular hemorrhage with fibrosis formation.

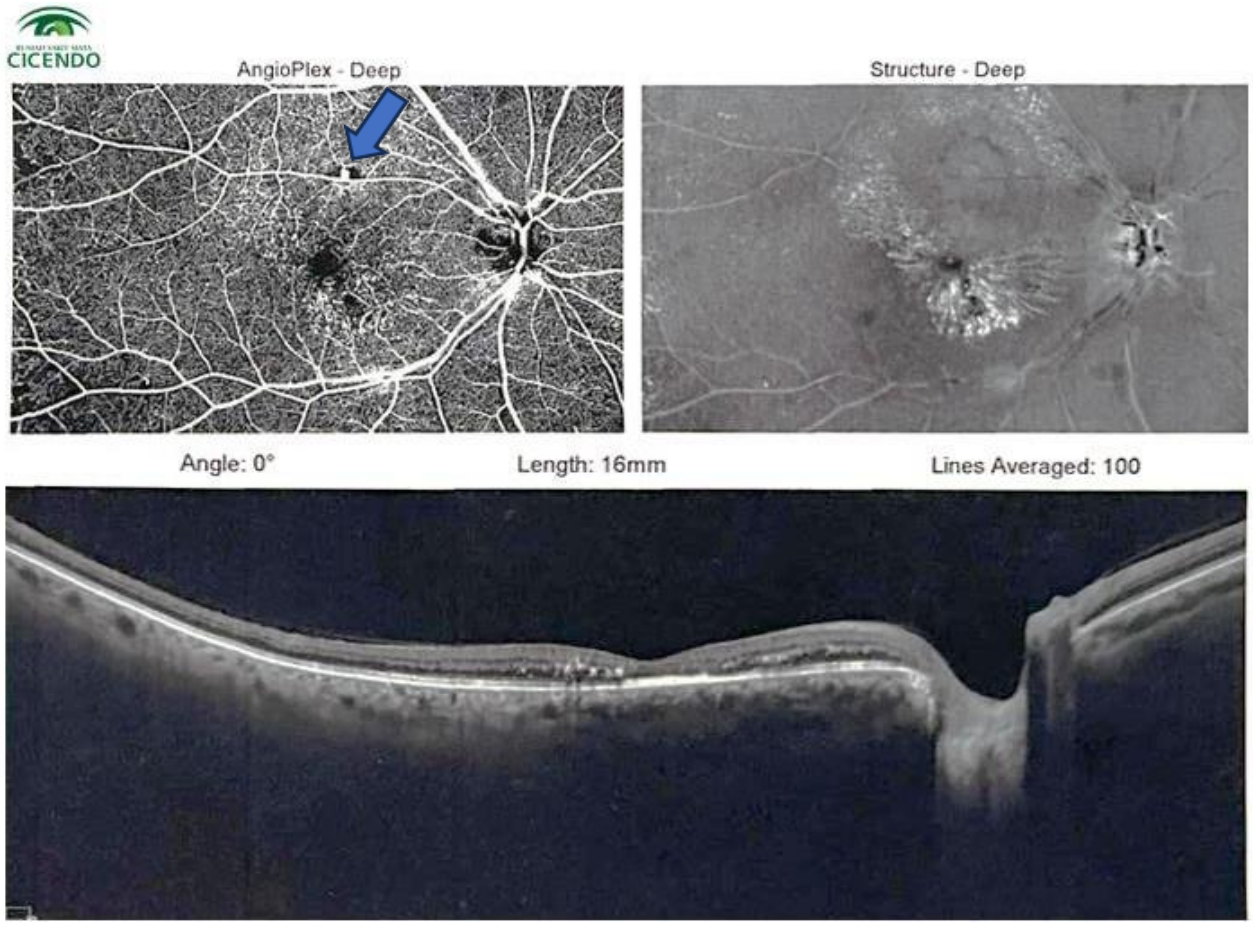

Figure 6. Optical coherence tomography angiography (OCTA) of the right eye revealed a decrease of locally enlarged and dilatation of blood vessels with a decrease in twisted blood vessels around the malformed vessel (blue arrow). The OCTA map of the right eye also showed a hyperreflective small area suggesting a fibrosis and scars laser.

The patient then underwent laser focal photocoagulation on the superior nodule lesion of the submacular hemorrhage. The total number of lasers were 3 times with a spot size of 50 micrometers, exposure time of 0.01 MSc and power of 200 mW. The patient was treated with natrium diclofenac eyedrops forth times a day and underwent OCT macula of both eyes. OCT of macula of the right eye showed no hyporeflective area of intraretinal, submacular and outer retinal structures compared to OCT before treatment was given, with disrupted foveal depression and hyperreflective area of submacular suggesting a resolving submacular hemorrhage with fibrosis formation (Figure 5).

The patient then underwent a follow-up examination 2 weeks after focal laser photocoagulation. OCTA of the right eye revealed decrease of locally enlarged and dilatation of blood vessels with a decrease in twisted blood vessels around the malformed vessels. The OCTA map of the right eye also showed a hyperreflective small area suggesting a fibrosis and scars laser (Figure 2.6). Microperimeter of the right eye showed decreased sensitivity in the central macula area compared to the left eye (Figure 7).

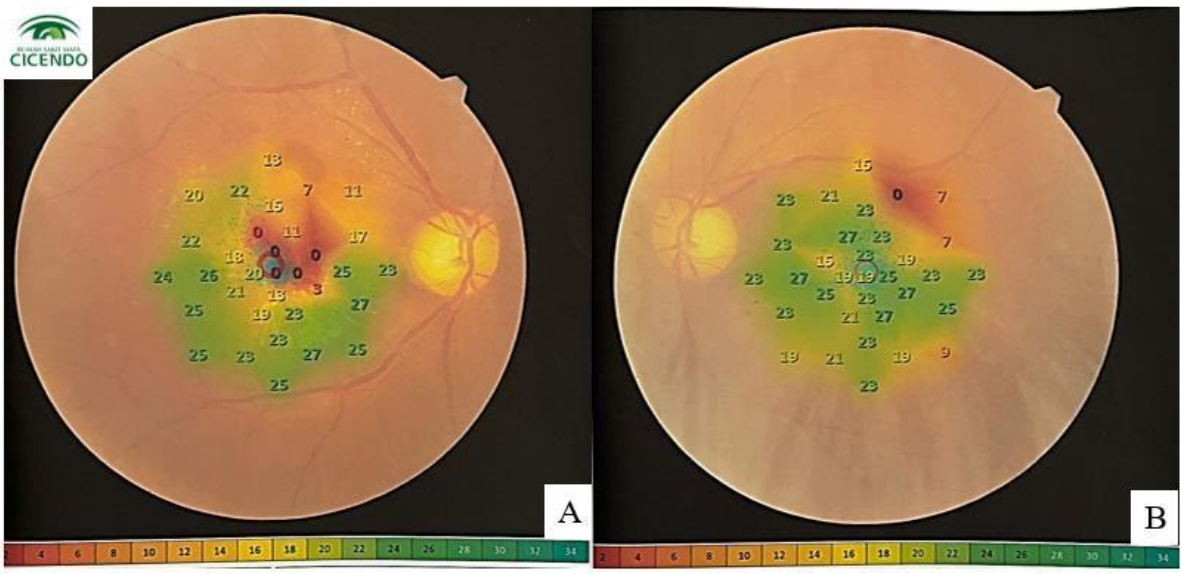

Figure 7. Microperimeter of the right eye (A) showed decreased sensitivity in the central macula area compared to the left eye (B).

The patient was diagnosed with Resolving Submacular Hemorrhage of the right eye suspected caused by Rupture Retinal Arterial Macroaneurysm or Macular Telangiectasia Type I and Retinopathy Hypertensive Grade II of both eyes, No Diabetic Retinopathy of both eyes with Diabetes Mellitus and Hypertension. Treatment was continued with natrium diclofenac eyedrop forth times a day on the right eye and anti-hypertensive and anti-diabetic medications from internal medicine. The patient will be evaluated for one month later. In this instance, the prognosis varies based on the severity of the illness, the patient's compliance with therapy, and the response to it.

DISCUSSION

Retinal arterial macroaneurysms (RAM) represent an acquired vascular integrity with a focal, circular or fusiform dilatation of the major retinal arteries that takes place in the central retinal artery's first three orders. it might have occurred at retina's temporal branch bifurcation points or the arteriovenous crossing.

The common systemic conditions associated with RAMs, 50%-75% of presenting patients having a long-term hypertension followed by arteriosclerosis and abnormal lipid levels. RAM most commonly develops in hypertensive women aged between 50-80 years. In this instance, a 57-year-old woman's primary complaint was a progressive loss of vision in her right eye. This condition showed that patient has unilateral finding that typical to RAM.

Her past medical history included over 13 years of continuous hypertension, diabetes mellitus, and high cholesterol, all of which were regularly managed with medication. These systemic diseases showed a strongly associate with arterial vascular disease and may contribute to acquired vascular injury that increased the risk for retinal macroaneurysm formation, so that the patient has a higher risk to RAM. The known risk factors for RAM in this case were female gender, advanced age,

systemic hypertension and hypercholesterolemia. Based on previous studies, hypertension is the primary inducement for RAM (Meng et al., 2022; Muacevic and Adler, 2022; Liu and Wang, 2023; Song et al., 2023).

The clinical presentation of RAM is diverse and has a high degree of variation. Previous research revealed that the clinical attributes of RAM, including demographics, risk factors, RAM type distribution, and lesion site, were restricted to particular patients, leading to inconsistent outcomes. Manifestations of RAM are caused by the inability of the arteries to maintain structure and decreased tolerance to pressure. The thin stretched arterial sac of RAM with high perfusion pressure that easily perforated, resulting in hemorrhage or fluid leakage of ruptured macroaneurysms.

Since bleeding can accour in the preretinal, intraretinal, subretinal, and vitreous regions, the first diagnosis can be very difficult to make. When associated hemorrhages or exudates in the macula, it could interfere the photoreceptor and cause irreversible damage that leads to sudden vision loss and blindness. In most of the case, visual acuity improves when the hemorrhages resolved. In this case, the funduscopic examination of the patient also showed a submacular hemorrhage, hard exudates with minimal tortuosity. Hemorrhage in this case was thought to be due to a ruptured macroaneurysm in the retinal artery. In case when hemorrhage does not resolve and fails to recover with scarring, the visual acuity becomes very poor. If left untreated, submacular hemorrhages can cause damage to photoreceptors, which means that affected eyes typically have poor visual outcomes (Erol et al., 2015; Chen et al., 2017; Goldhagen and Goldhardt, 2019; Kim et al., 2021; Meng et al., 2022; Doi et al., 2023; Liu and Wang, 2023; Song et al., 2023).

Retinal macroaneurysm can be identified by various imaging modalities such as fluorescein fundus angiography (FFA), OCT, OCTA, and indocyanine green angiography (ICGA). OCT and OCTA are noninvasive methods, where OCT is used to evaluate the depth, the exact localization of the macroaneurysms, and by concurrently monitoring the OCT images, the amount of blood flow to the macroaneurysms. Red blood cell movement and trajectory may be detected by OCTA, which also makes it possible to clearly see blood flow through the retina's many layers, optimizing the RAMs' three-dimensional localization. FFA is highly beneficial in detecting intraretinal macroaneurysm and to distinguish between saccular between saccular variations and fusiform variations, wherein saccular dilation has fill at a later stage and fusiform display early artery filling.

FFA provides comprehensive details on intraretinal microvascular anomalies, telangiectasias, nonperfusion regions, and capillary microaneurysms. RAM's true anatomical structure is more similar to the morphology of FFA. An extensive technique also helps ophthalmologists choose between vascular endothelial growth factor inhibitor and photocoagulation, or a combination of them, for the treatment. In this case, we identified the macroaneurysm by multimodal imaging such as fundus photograph, OCT and OCTA.

The OCT macula of the right eye showed hyporeflective with increased reflectivity area of intraretinal, submacular and disrupted foveal depression and submacular fluid suggesting a submacular hemorrhage. In a case presentation by Mechrgui, the OCT results of the RAM patient were also reported to exhibit dense subretinal and inner layer hyper-reflec-

tivity, followed by outer layer shadowing that was compatible with thick subretinal and intraretinal hemorrhages. Subretinal serohematic fluid was found to be associated with subfoveal hyporeflectivity. Upon doing an OCTA on the right eye, a defective blood artery on one side showed a significant dilatation and localized hypertrophy. In an additional case report, localized enlargement of twisted blood vessels on OCTA obtained before to therapy was significantly smaller than the spherical protrusions on FFA. It effectively confined the microaneurysm right after photocoagulation, preventing peripheral tissue ischemia. In this case, 2 weeks after focal laser photocoagulation, the OCTA also revealed decrease of locally enlarged and dilatation of blood vessels with a decrease in twisted blood vessels around the malformed vessels. The OCTA map of the right eye also showed a hyperreflective small area suggesting a fibrosis and scars laser. In this case, we did not carry out the FFA examination due to insurance problems. In previous study, FFA could shows a total blockage of the fluorescein, revealed a saccular lesion with late-phase fluorescein leakage, and visualized the lesion presented as local dilation (Chen et al., 2022; Muacevic and Adler, 2022; Song et al., 2023).

Retinal macroaneurysms and ruptured RAM should be distinguished from other conditions by the clinician with caution, including complicated posterior vitreous detachment, von Hippel-Lindau disease, exudative macular degeneration due to age, Valsalva retinopathy, and proliferative diabetic retinopathy. When an exudation predominates in clinical appearance, Coat's illness or retinal telangiectasia type 1 are additional disorders to be considered, as in this instance. Unlike RAM, which is frequently observed in the older female population, coat's disease and/or macular telangiectasia type 1, which is thought to be a form of coat's disease, usually affect young guys in their first decade of life who are healthy individuals. RAM often affects the central retinal artery;'s first three orders, with some cases occurring in the peripheral retinal capillaries (Speilburg and Klemencic, 2014; Muacevic and Adler, 2022; Ophthalmology, 2022).

Patients with RAM can recover spontaneously in 10%-20% cases, until now, there is no standard treatment guideline for symptomatic retinal macroaneurysms. Recommendations by Vander et al., suggested that patients with good vision and no macular involvement should be observed, patients with decreased visual acuity due to preretinal, intraretinal, subretinal or vitreous hemorrhage should be observed for spontaneous resolution before treatment is provided, and patients with macular involvement such as edema, exudates, or submacular hemorrhage, should be treated immediately. Treatment methods include laser photocoagulation, pars plana vitrectomy surgery, intravitreal administration of anti-vascular endothelial growth factor (anti-VEGF) and observation.

When the lesion does not pose a hazard to the fovea and there are no related consequences. The effectiveness of the observation approach is explained by RAM's ability to self-heal and recover spontaneously. When persistent hemorrhagic RAM occurs with severe bleeding such as vitreous hemorrhage it could result in progressively damaging photoreceptors and permanent vision impairment, immediate treatment such as pars plana vitrectomy (PPV) need to be considered. So, when RAM rupture is possible or when there is significant bleeding and exudates in the RAM, observation might not be the best course of action. In this instance, our

patient had bevacizumab intravitreal injection therapy, which was followed two weeks later by panretinal laser photocoagulation.

One week after the first treatment of intravitreal injection, showed improvement in visual acuity and after receiving laser photocoagulation, showed resolved submacular hemorrhage. The most commonly performed clinical therapy for RAM is panretinal laser photocoagulation, as in this case. It promotes closure of aneurysm and perianeurysmal vessel leakage to manage ruptured or leaky RAM. The RAM site can be treated directly or indirectly or indirectly using laser photocoagulation. Laser photocoagulation can help absorb the bleeding, deactivate RAM, and enhance vision.

Due to its inconsistent visual outcome and several consequences, including choroidal neovascularization, subretinal fibrosis, and expansion of the laser scar, photocoagulation with lasers is still controversial. Even though RAM can occasionally be found distant from the macula, bleeding and exudation can affect the macular region and make vision difficult. Anti-VEGF medications, such as aflibercept, ranibizumab, and bevacizumab, can cause macular exudates to rapidly vanish.

According to earlier research, no study has yet been conducted using aflibercept with RAM. Pichi et al. reported treating RAM with intravitreal bevacizumab injections in a prospective uncontrolled triad involving 37 patients. The study discovered that patients receiving three monthly injections had improved visual outcomes. VEGF inhibition in RAM results in prevent the formation of neovascularization, decrease macular exudation, reduced vascular permeability, reduced central macular thickness, and rapid improvement in BCVA leading to visual improvement, and may facilitate clearing of the various retinal hemorrhages.

Prior research indicates that exudative lesions typically react favorably to relatively tiny intravitreal anti-VIGF injections; for lesion near the fovea, laser therapy may be more appropriate. In cases like this one where there is chronic exudates following several injections, laser treatment can be utilized in addition to anti-VEGF treatment, which is also beneficial for resolution. In order to look into a new treatment option, Liu S et al. performed a study to evaluate the effectiveness of panretinal photocoagulation with lasers in combination with Lucentis injections in RAM patients.

Lucentis plus panretinal laser photocoagulation together shown to be a more clinically effective treatment than either treatment alone. Furthermore, when comparing combination treatment to laser panretinal photocoagulation treatment, a higher prognosis for the patients' quality of life was noted based on measures such as physical function, mental mood, visual acuity, and ability to engage in social activities. Hemorrhagic RAM can benefit from receiving laser and anti-VEGF therapy, according to a different research article by huang Ying et al. combination therapy lowers the quantity of anti-VEGF injections required. Combining laser and anti-VEGF therapy can enhance visual acuity in patients with symptomatic RAM, according to a study.

Prior research indicates that patients undergoing combination therapy were not administered laser and anti-VEGF medication concurrently or within a brief timeframe; rather, these therapies were introduced after the initial monotherapy's results fell short of expectations. RAM may be treated with intravitreal anti-VEGF drugs, laser photocoagulation, or combina-

tion therapy, which may diminish macular exudation more quickly, depending on whether it is hemorrhagic or exudative in nature (Erol et al., 2015; Goldhagen and Goldhardt, 2019; Chen et al., 2022; Muacevic and Adler, 2022; Wang et al., 2022; Huang et al., 2023; Liu and Wang, 2023; Song et al., 2023).

RAM's visual prognosis varies depending on its forms and problems; nonetheless, there is disagreement over the findings about the prognosis of various RAM types. The majority of cases will progress benignly through fibrosis, thrombosis, and spontaneous resolution. A follow-up visit is necessary every six months for instances that show no symptoms until a full remission is obtained. Patients with macular sparring problems from RAM who provide a low risk to their vision should be continuously monitored for the first month.

If the complications pose a significant risk to their eyesight, prompt treatment is essential for better visual results and a good prognosis. Individuals with observation alone may not have as good of a prognosis as those who undergo one or two therapies. According to earlier research, hemorrhagic RAM is better for visual prognosis when treated with laser photocoagulation or observation, while exudative RAM is better for visual prognosis when treated with anti-VEGF (Chen et al., 2017, 2022; Muacevic and Adler, 2022).

This case report highlights a rare retinal arterial microaneurysm (RAM), emphasizing the importance of a thorough diagnostic approach and combination therapy for management. RAM, an acquired vascular disease characterized by focal dilation of the central retinal artery, presents with diverse clinical manifestations, often complicated by associated systemic conditions such as hypertension and diabetes. Diagnostic confirmation was achieved using advanced imaging modalities, including optical coherence tomography (OCT) and OCT angiography (OCTA), which effectively delineated the lesion's structure and vascular alterations.

Treatment with intravitreal anti-VEGF injections followed by panretinal laser photocoagulation demonstrated significant resolution of submacular hemorrhage and improvements in visual acuity. The combination therapy proved more effective than monotherapy, offering faster reduction of macular exudation and better visual outcomes. This case underscores the necessity of individualized treatment planning and regular monitoring to manage complications and optimize prognosis in patients with RAM.

We have reported a rare case of retinal arterial microaneurysm (RAM) on female with unilateral finding that manifested as submacular hemorrhage that caused by ruptured of RAM, and treated with combination therapy. RAM is an acquired vascular disease with a focal, fusiform or saccular dilatation within the first three orders of the central retinal artery and has a high degree of variation. Hemorrhage is a frequent presentation of RAM which lead to permanent vision loss.

Retinal macroneurysm can be diagnosed with various imaging modalities such as FFA, OCT, and OCTA. Combination therapy for RAM with laser panretinal photocoagulation and anti-VEGF injection is more effective than monotheraphy. Combination therapy is a novel therapy option to treat RAM and may reduce the macular exudation faster with visual acuity improvement.

AUTHORS CONTRIBUTION

All authors contributed to the writing and compilation of this article.

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CONFLICT OF INTEREST

The author declares no conflict of interest.

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