

## Case Report

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## Multiple Retinal Macroaneurysms in a Hypertensive Patient

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### ABSTRACT

**Purpose:** The evaluation of different therapeutic strategies in a patient with multiple retinal arterial macroaneurysms.

**Case:** A 71-year-old female hypertensive patient is treated for several retinal macroaneurysms both exudative and hemorrhagic, over a period of four years. Clinical evaluation, fluorescein angiography and optical coherence tomography findings are included.

**Results:** Hypertension is strongly associated with macroaneurysm development. Indirect laser treatment and vitrectomy are proven useful when indicated according to the type of the lesion and the visual outcome is encouraging even after several interventions.

**Conclusion:** Although acquired RAMs are usually considered solitary lesions, a patient with four RAMs in the same eye is described in the present report. The characteristics of each RAM require a different therapeutic strategy and close monitoring is also essential.

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### Introduction

A retinal macroaneurysm is an acquired anomaly of the retinal vasculature. It constitutes a focal vascular dilation following a linear break of the vessel wall. Macroaneurysm classification falls into four categories: arterial, venous, capillary and associated with collateral vessels [1]. Arterial macroaneurysms are the most common and they are mainly located within the first three orders of the arterial tree [2].

Two types of RAMs (retinal artery macroaneurysms) are mostly encountered in relation to the structural anatomy of the aneurysm. The first type refers to a fusiform (cuffed) dilation that is prone to exudation and the latter being the saccular (blow-out) swelling that primarily results in hemorrhage in any of the four levels (subretinal, intraretinal, preretinal and subhyaloid) [3].

Macroaneurysms are often asymptomatic but they can also cause either acute or chronic progressive visual loss [4]. In cases of acute decompensation, the main clinical feature is hemorrhage whereas when chronic decompensation is observed RAMs are primarily exudative.

RAMs are often described as unilateral solitary and independent incidents [3,4]. According to a case-control study by Pantou et al. only 12% of RAM patients had more than one macroaneurysm in the same eye. We report a case of a 74-year-old patient that has

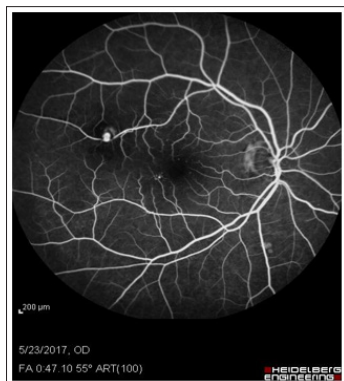
developed three RAMs over a follow up period of four years. Every RAM is treated individually according to up to date guidelines and the follow up is up to this date ongoing [5].

### Case Description

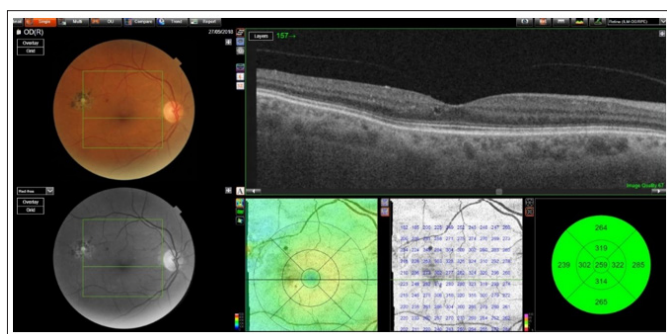
A 71-year-old female patient presented to the outpatient eye department with distortion of central vision in her right eye. She mentioned no previous eye problems. Her medical history included thyroid disease, hyperlipidemia, diabetes mellitus type 2 (under metformin and linagliptin for 13 years and 2 years respectively) and systemic hypertension (under atenolol and amlodipine for 17 years). Her visual acuity was 20/32 in both eyes, her IOP was 15 in both eyes and the slit lamp examination for the anterior segment showed no pathological signs. Her Amsler grid assessment for the right eye was abnormal. Dilated funduscopy revealed background diabetic retinopathy and a possible macroaneurysm of the superior temporal retinal artery with surrounding perianeurysmal flame shaped intraretinal hemorrhages and exudation that extended towards the macular area. Macular oedema was present at the time. The patient underwent complete medical work up without any remarkable abnormal findings. A fundus fluorescein angiography FFA validated the diagnosis and showed patent flow within the aneurysmal wall and late leakage of the RAM (at the superior temporal retinal artery), so laser treatment was subsequently planned. Near the fovea, another possible small RAM was identified with the FFA and monitored closely thereafter. Indirect perianeurysmal Argon-laser treatment in one session was applied one week later (100–200 μm, 100–200 ms, moderate blanching) that resulted in the thrombosis of the macroaneurysm and slow

resorption of the surrounding hemorrhages and gradual exudate dispersal without any effect in VA. Following that macular oedema developed, which was treated with a single anti VEGF injection. The patient had been followed up regularly since then without any major changes in VA.

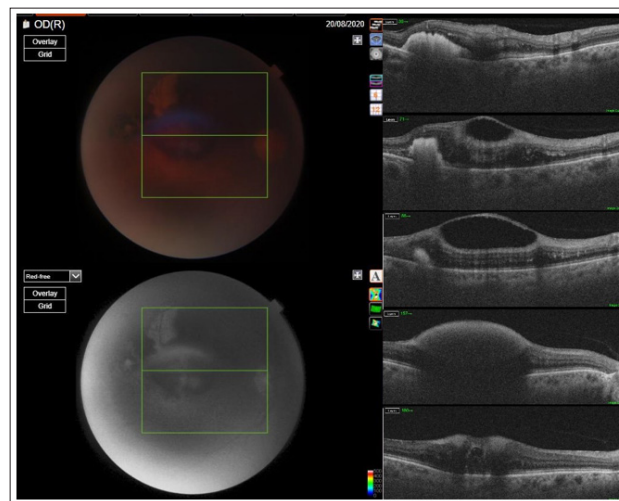
Three years later, during a scheduled follow up, patients' visual acuity decreased from 20/40 to 20/63 in the right eye while the other eye was unaffected. Her last HbA1c was 6.0 %. Mild background diabetic retinopathy had already been reported. Fundoscopy revealed a third, blown-out macroaneurysm on the course of the same branch of the superior temporal artery proximally to the macula that caused significant perianeurysmal intraretinal hemorrhages and macular edema. Indirect laser treatment was yet again applied perianeurysmally. During the next follow up, fundoscopy revealed a large preretinal hemorrhage covering the macula causing the VA to dive to 'counting fingers' in one meter. Within one week, 25 G pars plana vitrectomy with internal limiting membrane peeling and gas injection was performed. No complications were observed during or after the operation. Post-op VA rose slightly to 20/63 which we consider to be caused by some extent of macular ischemia. Mild macular edema was treated with anti-inflammatory drops. An FFA performed 2 months post-op revealed signs compatible with RAM resolution such as the kinking of the vessel at the RAM sight and mild arterial sheathing/vessel dilation on the course of the vessel just after the RAM. Nevertheless, one more macroaneurysm was spotted. This fusiform RAM was located on the superior temporal artery again, even more proximally to the optic disc. This lesion is currently being observed as there are no indications for intervening [6].



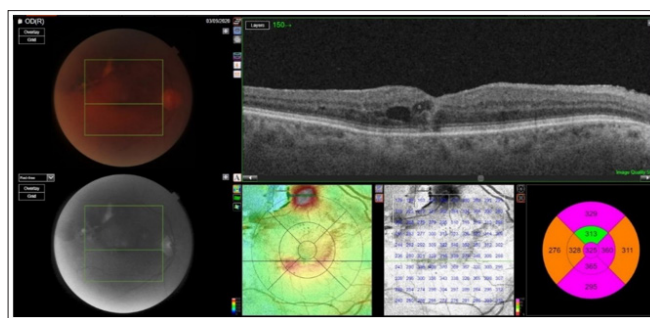
**Figure 1:** FFA showing 1<sup>st</sup> RAM of the superior temporal retinal artery pre-treatment and a 2<sup>nd</sup> smaller one near the fovea



**Figure 2:** OCT and fundus photo sixteen (16) months after laser treatment of 1<sup>st</sup> RAM, perianeurysmal scarring and stable small cystic space



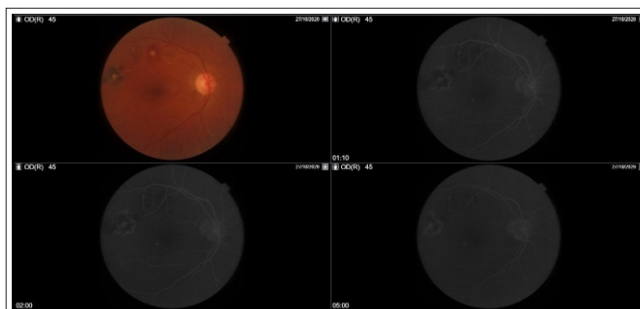
**Figure 3:** OCT sequence and fundus photo depicting dense preretinal hemorrhage affecting the macula from 2<sup>nd</sup> RAM after local laser treatment



**Figure 4:** OCT and fundus photo two-week post op showing resorption of hemorrhage and mild macular oedema



**Figure 5:** Fundus photo one-month post-op showing significant dispersal of hemorrhage



**Figure 6:** FFA photos two months post-op showing two old, involuted RAMs and two more, a small one proximally to the fovea and a new one on the course of the superior temporal retinal artery at the arterio-venous crossing near the optic disc

## Conclusions

RAM is a rare pathology most often related to hypertension and atherosclerosis in older female patients as described in this case. In terms of epidemiology, macroaneurysms occur between the sixth and eighth decade of life and express a female predominance in over 60% of total cases [7,8]. RAMs are generally considered solitary phenomena. Abdel-Khalek et al. reported single macroaneurysms in 65% and multiple in 35% of the cases in his study [3]. In the present case we have spotted four macroaneurysms in the same eye so far, three of them were located on the same arterial branch whereas the other one is on the course of the inferior temporal artery.

From a histopathological perspective, vessel wall damage is precipitated by sclerotic changes and elevated blood pressure. Patients with chronic systemic hypertension and other microvascular pathologies such as DM2 exhibit wall thinning and decreased elasticity thus forming dilations in retinal vessels. In our case, three aneurysms are saccular and the first two have bled out. This is in accordance with previous findings stating that saccular macroaneurysms are more prone to bleeding because of their micro-architecture especially in vessels with high perfusion rate as in the first orders of bifurcation [3].

The clinical features of a RAM range from a quiescent lesion to severe loss of vision. As a result, the majority of RAMs remain unnoticed and unreported. When their implications- either exudation or hemorrhage- affect the macula, they result in vision loss. In our report, RAM-associated retinal hemorrhage is present, initially as a localized perianeurysmal hemorrhage and afterwards as an extensive preretinal hemorrhage involving the macula and causing acute visual decompensation. Retinal hemorrhages account for 81% of the clinical features of symptomatic RAMs and especially pre-retinal hemorrhages do not manifest in more than 40% of them [5,6].

A variety of treatment options have been proposed for macroaneurysms over the years. Most RAMs will involute spontaneously without any treatment so only regular monitoring will be necessary [9,10]. Nevertheless, when the macula is involved or threatened intervention is required. Specifically, recurrent bleeding or exudates affecting the macula are indications for photocoagulation [3,10]. Both direct and indirect laser methods are used. Rare complications from photocoagulation are reported i.e. vitreous hemorrhage, choroidal neovascularization, retinal vein occlusion and secondary RAM development although they can also occur directly from the MA [6,11]. We opted for indirect laser treatment initially that successfully thrombosed the MA so direct photocoagulation was unnecessary. The VA value did not change after initial observation and laser treatment, which is in accordance with the findings of Brown et al [11].

When a dense preretinal hemorrhage covers the macula, YAG laser hyalodotomy has been proposed as an alternative to vitrectomy. Although YAG laser application proved effective in dispersing the preretinal hemorrhage, the resorption of the blood was slow in eyes with sub-ILM hemorrhage [10-12]. We decided on performing core vitrectomy followed by ILM peeling and gas insertion. This is a simple technique that results in favorable outcomes with a significant increase in visual acuity and without serious post-op complications according to Kitagawa et al. In our case, vitrectomy was uncomplicated and managed to improve VA from 'finger counting in one meter' to 20/63. A further increase in VA would be possible, had it not been for macular ischemia.

The patient discussed in this paper has developed four macroaneurysms in the same eye over the years. A strong association between RAMs and systemic hypertension has been manifested in the literature and this case confirms it. Three of these RAMs shared the characteristic of being hemorrhagic, yet they have had different management options. A significant improvement in VA has been achieved after every incidence. Nonetheless, follow-up is ongoing as new RAMs have arisen. This rare case highlights not only the need for extended guidelines but also the need for personalized treatment in RAM patients.

## Statements

### Acknowledgement

We thank Miss Koutentaki Marialena, the ophthalmic medical technician of the department, for her contribution in this case over the years.

### Statement of Ethics

All subjects discussed in this paper have given their written informed consent.

### Conflict of Interest Statement

There are no financial conflicts of interest to disclose.

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### Author Contributions

All authors contributed equally to treating the patient and participated in the writing process afterwards.

## References

1. Cousins SW, Flynn HW, Clarkson JG (1990) Macroaneurysms associated with retinal branch vein occlusion. *Am J Ophthalmol* 109: 567-570.
2. Palestine AG, Robertson DM, Goldstein BG (1982) Macroaneurysms of the retinal arteries. *Am J Ophthalmol* 93: 164-171.
3. Abdel-Khalek MN, Richardson J (1986) Retinal macroaneurysm: natural history and guidelines for treatment. *Br J Ophthalmol* 70: 2-11.
4. Rabb MF, Gagliano DA, Teske MP (1988) Retinal arterial macroaneurysms. *Surv Ophthalmol* 33: 73-96.
5. Pantou RW, Goldberg MF, Farber MD (1990) Retinal arterial macroaneurysms: risk factors and natural history. *Br J Ophthalmol* 74: 595-600.
6. Hughes EL, Dooley IJ, Kennelly KP, Doyle F, Siah WF, et al (2016) Angiographic features and disease outcomes of symptomatic retinal arterial macroaneurysms. *Graefes Arch Clin Exp Ophthalmol* 254: 2203-2207.
7. Yanoff M, Duker JS. *Ophthalmology* [Internet]. 2nd ed. Philadelphia, PA: Mosby Elsevier; 2004 [cited 2021 Apr 10]. Available from: [https://books.google.gr/books/about/Ophthalmology.html?id=u43MTFr7-m8C&redir\\_esc=y](https://books.google.gr/books/about/Ophthalmology.html?id=u43MTFr7-m8C&redir_esc=y)
8. Lavin MJ, Marsh RJ, Peart S, Rehman A (1987) Retinal arterial macroaneurysms: a retrospective study of 40 patients. *Br J Ophthalmol* 71: 817-825.
9. Kester E, Walker E (2009) Retinal arterial macroaneurysm causing multilevel retinal hemorrhage. *Optometry - Journal of the American Optometric Association* 80: 425-430.
10. Kitagawa Y, Kawamorita A, Shimada H, Nakashizuka H (2019) Treatment of macular hemorrhage in retinal arterial macroaneurysm: anatomic site-oriented therapy. *Jpn J Ophthalmol* 63: 186-196.
11. Brown DM, Sobol WM, Folk JC, Weingeist TA (1994) Retinal

arteriolar macroaneurysms: long-term visual outcome. Br J Ophthalmol 78: 534-538.

12. Dahreddine M, Eldirani H, Mutsinzi E, Hirsch A (2011) [Retinal arterial macroaneurysm complicated by premacular hemorrhage: treatment by YAG laser disruption]. J Fr Ophtalmol 34: 131.e1-5.

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