To laser or not?

Vishal Govindhari, Jay Chhablani

A 64-year-old male patient presented to the clinic with diminished vision in his right eye for the past 2 years. Examination revealed a best-corrected visual acuity (BCVA) of counting fingers at 1 m with a scarred choroidal neovascular membrane (CNVM) in the right eye while the left eye had a BCVA of 20/20 with a small peripapillary subretinal hemorrhage along with angioid streaks in both eyes. Multimodal imaging revealed the presence of a CNVM in the left eye which was treated with focal thermal laser. Regression was noted on optical coherence tomography angiography at 1 month post-laser, but at 3-month follow-up, exacerbation of the CNVM was observed. Subsequently, four intravitreal ziv-aflibercept injections were given, and scarring of CNVM was noted on OCT. Thermal laser in the background of angioid streaks has worsened the breaks in the Bruch's membrane leading to worsening of the CNVM.

Key words: Angioid streaks, choroidal neovascular membrane, focal laser, optical coherence tomography angiography, ziv-aflibercept

Access this article online	
Quick Response Code:	Website: www.ijo.in
	DOI: 10.4103/ijo.IJO_837_17

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Manuscript received: 24.09.17; Revision accepted: 17.11.17

Angioid streaks represent a very subtle clinical entity with a potential of causing significant vision loss. Choroidal neovascular membrane (CNVM) involving the macula followed by streaks extending subfoveally have been described as the most common causes of vision loss.[1] Anti-vascular endothelial growth factor (VEGF) injections are currently the treatment of choice for angioid streak CNVM.[2] Thermal laser has been described as an effective treatment modality for the treatment of extrafoveal CNVM of varied etiologies including angioid streaks.[3] We herein describe a case of angioid streak-associated extrafoveal CNVM treated with focal laser, which demonstrated exacerbation of the CNVM post-laser, using optical coherence tomography angiography (OCTA).

Case Report

A 64-year-old male patient presented with gradual painless diminution of vision in his right eye for the past 2 years. He was previously diagnosed as right eye wet age-related macular degeneration and was treated with four intravitreal anti-VEGF injections 2 years back. Left eye was asymptomatic and had undergone a cataract surgery 1 year back. He was a known hypertensive under oral medications for the past 10 years.

Best-corrected visual acuity (BCVA) in his right eye was counting fingers at 1 m while left eye had a BCVA of 20/20. Fundus examination revealed a scarred CNVM in his right eye and a small peripapillary subretinal hemorrhage with a dry macula in his left eye [Fig. 1a] along with angioid streaks in both eyes. Fundus fluorescein angiography (FFA) and indocyanine green angiography (ICG) were suggestive of the presence of CNVM in the left eye [Fig. 1b and c]. OCTA revealed a very subtle complex in the deep retinal segmentation corresponding to the leakage on FA in the left eye [Fig. 1d] without any subretinal fluid under the fovea on cross-sectional scan [Fig. 1e]. Considering the extrafoveal location of the

Cite this article as: Govindhari V, Chhablani J. To laser or not?. Indian J Ophthalmol 2018;66:463-6.

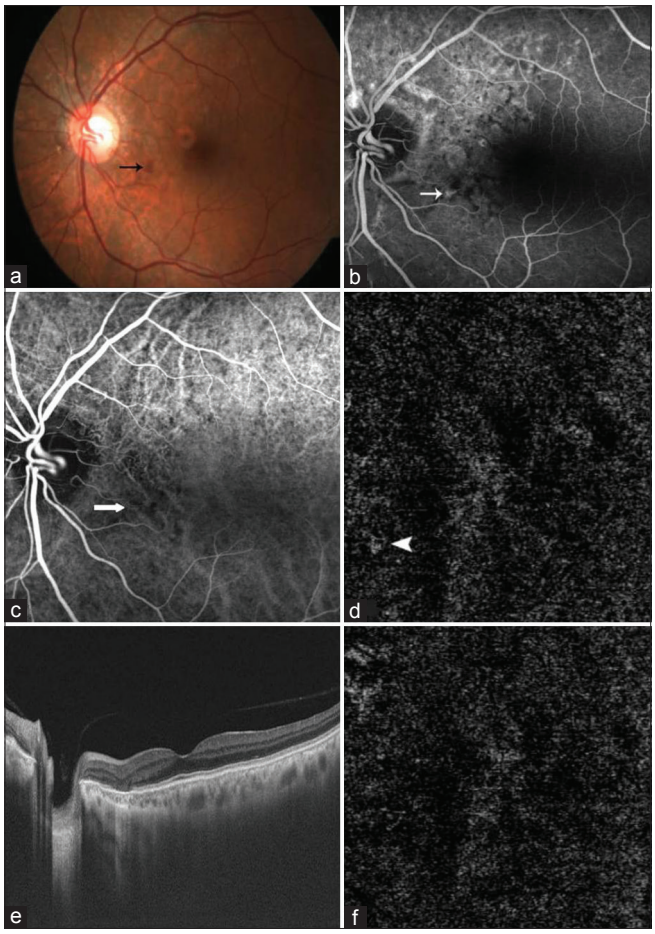

Figure 1: Fundus photograph of the left eye (a) showing small peripapillary subretinal hemorrhage (black arrow). Fundus fluorescein angiography and indocyanine green angiography (b and c) suggestive of the presence of a choroidal neovascular membrane (white arrow). Optical coherence tomography angiography (d) shows a subtle vascular network (white arrowhead) in the deep retinal segmentation. Optical coherence tomography cross-section (e) showed no subretinal fluid at the macula. One month postlaser, regression of the choroidal neovascular membrane complex was noted on optical coherence tomography angiography (f)

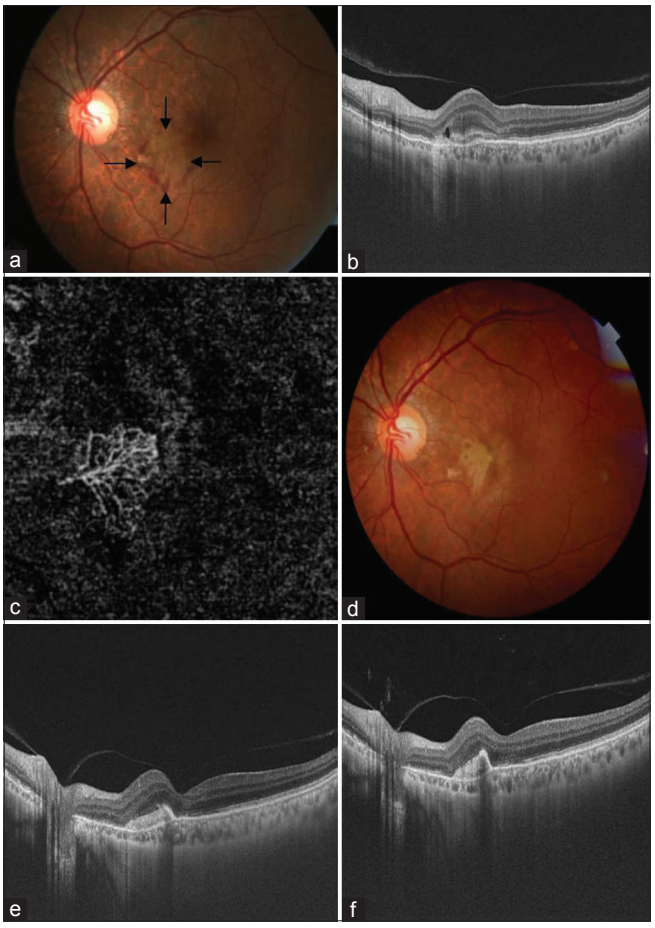

Figure 2: Fundus photograph at 3-month follow-up (a) showing a large dirty gray membrane surrounded by subretinal hemorrhage (black arrows) with activity on optical coherence tomography cross-section (b). Optical coherence tomography angiography (c) showing a prominent neovascular network in the deep retinal segmentation. One month post-intravitreal injection, fundus photograph (d) shows scarring while the optical coherence tomography (e) shows minimal intraretinal fluid. Optical coherence tomography after the second intravitreal injection (f) shows a scarred choroidal neovascular membrane with no activity

CNVM, an OCTA-guided focal laser was planned for in the left eye. A 532 nm focal laser was done with a spot size of 100 μ, 200 mJ power, and 200 ms duration. One month post-laser, BCVA in the left eye was 20/20, the subretinal hemorrhage had resolved and a regression of the CNVM complex (in the deep retinal segmentation) was noted on OCTA [Fig. 1f].

At 3-month follow-up, the BCVA in the left eye had reduced to 20/30 with a marked increase in the subretinal hemorrhage surrounding a dirty gray membrane located between the disc and macula with activity on OCT [Fig. 2a and b]. FFA confirmed the presence of an active classic CNVM which was larger in size compared to baseline [Fig. 3a-c]. OCTA showed an increased CNV network in the deep retinal and choriocapillaris segmentation [Fig. 2c]. We noted a post-laser worsening of the angioid streak-associated CNVM and advised intravitreal ziv-aflibercept (IVZ) injection (1.25 mg in 0.05 ml). One month post-intravitreal injection, the left eye showed scarring of the CNVM with minimal residual intraretinal fluid and no subretinal fluid [Fig. 2d and e, 4a]. After the second IVZ injection, he was maintaining visual acuity of 20/20 with no activity on cross-sectional scan [Fig. 2f and 4b]. Over the next 3 months, the patient maintained a visual acuity of 20/20 but OCT demonstrated the presence of intraretinal fluid [Fig. 4c-e] and he received the third and fourth IVZ injections accordingly. The patient is scheduled to follow up one month after the fourth IVZ injection.

Discussion

Histologically, angioid streaks represent breaks at the level of the elastic lamina of the Bruch's membrane (BM) with associated calcification.[4] The overlying retinal pigment epithelium as well as the underlying choriocapillaris also show associated degeneration.[5] Electron microscopy of the streaks confirms a degenerative pathology with the presence of granulomatous material in the elastic lamina of the BM. The altered nature of the elastic lamina and its brittleness explains the worsening of the CNVM post-laser in our case. Modalities such as thermal

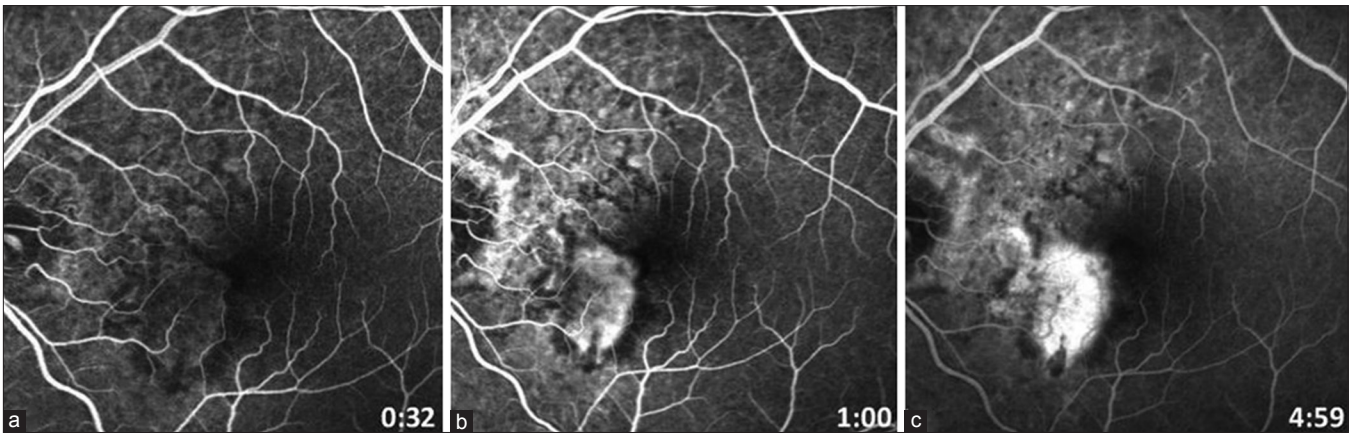

Figure 3: Fundus fluorescein angiography (a-late venous phase, b-recirculation phase, c-late phase) performed at 3-month follow-up, confirming the presence of an active classic choroidal neovascular membrane and demonstrating worsening of the choroidal neovascular membrane compared to baseline

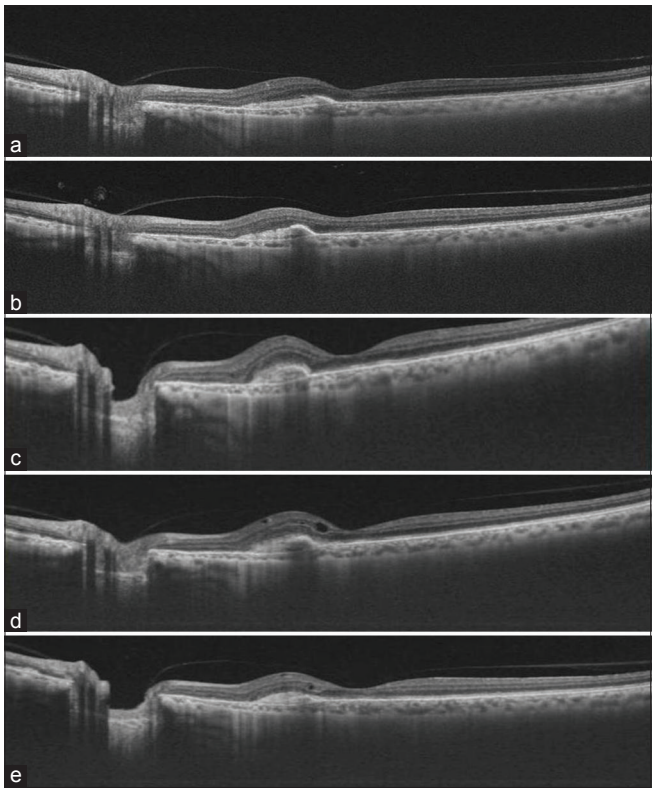

Figure 4: Serial monthly optical coherence tomography images starting from the 4th month (a) to the 8th month (e). Scans b-d represent the 5th, 6th and 7th month OCT respectively. The patient has a received a total of four ziv-aflibercept injections in the course of his treatment

laser and photodynamic therapy may further damage the brittle BM and enlarge the openings in the BM leading to enlargement of CNVM. Furthermore, the ensuing scarring post-laser may encroach onto the macula contributing to vision loss.[6]

Thermal laser has been used as a modality for the treatment of angioid streak-associated extrafoveal CNVM. Singerman and Hatem in their series on laser treatment for extrafoveal CNVM associated with angioid streaks, demonstrated that the treated eyes had either retained or improved visual acuity in comparison to the untreated eyes which invariably lost vision. They also added that careful case selection and an indefinite follow-up to look for recurrences are essential in thermal laser-treated cases.[7] Gelisken *et al*., in a larger series of eyes with longer follow-up, concluded similarly that the laser-treated eyes fared better in comparison to the untreated eyes.[3] Lim *et al*. stated that thermal laser results in closure of CNVM and stabilization of visual acuity. They also looked at the status of the fellow eyes and concluded that the recurrence rates and visual outcomes were better when the fellow eye had no CNVM or disciform scarring.[8]

Conclusion

In our case, the presence of CNVM on OCTA instigated us to treat the extrafoveal CNV in spite of minimum leakage on FFA. Therefore, understanding of the underlying degenerative pathology in angioid streaks is warranted during the management of associated CNVM. Anti-VEGF injections represent a safe treatment modality with lower incidence of untoward side effects such as exacerbation of the CNVM.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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