# Correspondence

## Characteristics of Neovascularization in Early Stages of Proliferative Diabetic Retinopathy by Optical Coherence Tomography Angiography

EDITOR:

WE READ WITH INTEREST THE ARTICLE TITLED "CHARACteristics of Neovascularization in Early Stages of Proliferative Diabetic Retinopathy by Optical Coherence Tomography Angiography" by Pan and associates.[1]

The duration of diabetes has not been mentioned, and we were curious to know if either the duration or the level of blood sugar control had any correlation with the type of neovascularization elsewhere (NVE) noted.

It has been mentioned that the type of neovascularization could prognosticate the surgical outcomes and decide the type of surgery; however, we would like to ask the authors if they would not consider panretinal photocoagulation in either of the NVE types. Also, do the authors feel the results of photocoagulation could be impacted by the NVE types? We propose that a masked study could have proved better to prognosticate by assessing the level of difficulty faced by the surgeon in a particular type of NVE. Moreover, a single patient may have all 3 types of NVEs.

Though the authors have mentioned that the study sample was small, specifying the confidence interval along with the percentages and significance levels could help to extrapolate it to the population at large.

NEHA CHOWDHARY
ANKITA SHRIVASTAV
VIKRAM VINAYAK KOUNDANYA
RAHUL MAYOR
SHALINI SINGH
MANISHA AGARWAL
*New Delhi, India*

FUNDING/SUPPORT: NO FUNDING OR GRANT SUPPORT. Financial Disclosures: The following authors have no financial disclosures: Neha Chowdhary, Ankita Shrivastav, Vikram Vinayak Koundanya, Rahul Mayor, Shalini Singh, and Manisha Agarwal. The authors attest that they meet the current ICMJE criteria for authorship.

REFERENCE

1. Pan J, Chen D, Yang X, et al. Characteristics of neovascularization in early stages of proliferative diabetic retinopathy by optical coherence tomography angiography. *Am J Ophthalmol* 2018;192:146–156.

REPLY

WE HAVE DESCRIBED 3 SUBTYPES OF NEOVASCULARIZATION elsewhere (NVE) that originate from different vessels in proliferative diabetic retinopathy (PDR) in our study.[1] Type 1 NVEs originate from the venous side and are located at the margin of capillary nonperfusion (CNP). Type 2 NVEs originate from the capillary plexus and are located in the CNP. Type 3 NVEs originate from the sea-fan-like intraretinal microvascular abnormalities (IRMAs) and are located in the CNP.

Type 1 NVEs have a partially detached posterior hyaloid face and are observed as a "tabletop"; types 2 and 3 NVEs have numerous dense roots and are adhered firmly to the posterior hyaloid's face with short attachments to the retina. Moreover, affiliated nonperfusion areas (NPAs) observed in our study performed as type 1 < type 3 < type 2. Another important fact is that a single eye may have all 3 types of NVEs and that the distribution and patterns of NVE can be entirely different between eyes in a single patient. Based on these observations, we speculate that NVE patterns are closely associated with local situations such as local hypoxia and vitreous status, rather than with the level of blood sugar control. Nevertheless, further studies and larger numbers of patients are needed to clarify the relationship between NVE patterns and the levels of blood sugar control.

Considering that new vessels change morphologically and histologically, both by panretinal photocoagulation (PRP) and by anti-VEGF therapy,[2,3] we enrolled patients who were naïve to treatment to uncover the characteristics of neovascularization in early PDR. Further research is needed to discover the characteristics of neovascularization after therapy in PDR. In fact, we are planning a study of the characteristics of neovascularization after PRP. We obtained some interesting findings: fine new vessel regression; some new vessels maturing rather than regressing; and type 2 NVEs more easily regress than do types 1 and 3 NVEs after PRP. A masked study would have been preferable with respect to prognostication by assessing the level of difficulty faced by the surgeon for a particular type of NVE. However, it is important to note that we enrolled patients in early stages of PDR, and they would be treated by PRP or by anti-VEGF. Most of these patients would not necessarily be treated by pars plana vitrectomy in the short term. Moreover, if PDR progressed and reached surgical indications, it would be difficult to identify the NVE patterns because of the shielding caused by vitreous hemorrhage or by the NVE complex shadow.



0002-9394/$36.00
https://doi.org/10.1016/j.ajo.2018.08.042