Chapter 17
Vascular Tumors of the Posterior Pole

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Abstract Vascular tumors of the posterior pole represent a significant percentage of lesions managed by ocular oncologists. The spectrum of disorders includes retinal vascular tumors, choroidal lesions, and various neuro-oculo-cutaneous syndromes. Management of the ocular lesions varies, depending on the size and location of the lesion and its associated ocular damage. Small, asymptomatic peripheral lesions can be observed. Larger and symptomatic lesions can be treated successfully with radiation therapy, either through an external approach or with a radioactive plaque. Some can be treated with laser photocoagulation or photodynamic therapy. While vascular tumors of the retina are benign, they often can be associated with various syndromes that harbor neoplastic potential, and it is important to identify those lesions that may be associated with neoplastic risk.

17.1 Introduction

Vascular tumors of the posterior pole represent a significant percentage of lesions managed by ocular oncologists. The spectrum of disorders includes retinal vascular tumors, choroidal lesions, and various neuro-oculo-cutaneous syndromes (i.e., phakomatoses). This chapter will focus on the most common vascular tumors encountered at a tertiary cancer center. It is by no means an exhaustive review of all vascular lesions encountered in the posterior pole.

17.2 Retinal Capillary Hemangioma and von Hippel–Lindau Disease

Retinal capillary hemangiomas, also known as hemangioblastomas, are acquired circumscribed vascular tumors of the retina. Retinal capillary hemangiomas often have

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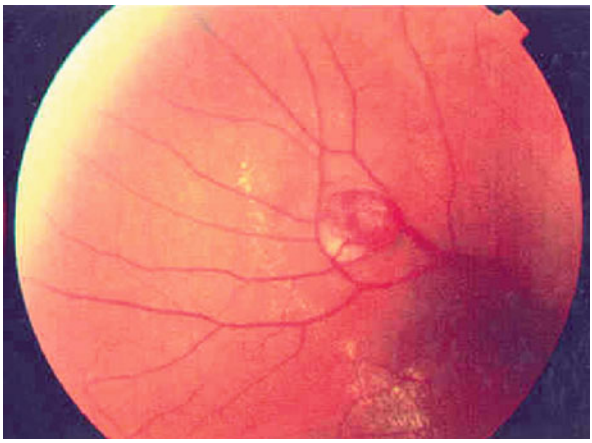

Fig. 17.1 Fundus photograph of an untreated retinal hemangioma in a patient with von Hippel–Lindau syndrome. Note the adjacent subretinal exudation

an orange-red appearance with associated prominent feeder vessels, vascular dilatation, and tortuosity (Fig. 17.1). Associated retinal and subretinal exudations are not uncommon in larger or more active lesions. Small lesions may be asymptomatic, while actively growing tumors are often associated with blurry vision or photopsias (flashing lights). While most lesions have a characteristic appearance that is diagnostic on ophthalmoscopy, fluorescein angiography can be helpful in identifying feeder vessels and active areas of leakage.

Ocular oncologists must be aware of the association between retinal capillary hemangiomas and von Hippel–Lindau disease. While many retinal capillary hemangiomas are idiopathic and occur spontaneously, a significant percentage are associated with von Hippel–Lindau disease, a disorder that occurs in 1 in 32,000 to 1 in 40,000 live births per year and presents in an autosomal dominant fashion. Pathogenesis is associated with the lack of production of the protein associated with the von Hippel–Lindau disease gene, which leads to excessive production of vascular endothelial growth factor. This excessive production leads to various vascular tumors of the brain, spine, and retina as well as renal cell carcinomas, pheochromocytomas, and neuroendocrine tumors of the pancreas. Genetic testing is available to screen asymptomatic family members. Those who possess the gene defect should undergo annual ocular screening, including dilated funduscopic assessment, with more frequent exams during pubescent years [1].

Management of ocular lesions depends on the size and location of the lesion and its associated ocular damage. Small, asymptomatic peripheral lesions can be observed, particularly if they are not associated with exudation and remain smaller than 0.5–1 mm. Tumors that are actively leaking can be treated with laser photocoagulation. Generally, this approach requires multiple treatments applied to the tumor and feeding artery. Argon photocoagulation is often used, but recent reports have also described the role of infrared 810-nm diode laser therapy (thermotherapy).

Thermotherapy tends to be most effective with tumors that are 1.5 mm or smaller. For larger lesions and lesions in the peripheral transscleral region, cryotherapy can be effective.

As retinal capillary hemangiomas increase in size, they become more resistant to focal modalities, such as laser and cryotherapy. Lesions larger than 4 mm can be treated successfully with radiation therapy, either through an external approach or with a radioactive plaque. Vitreoretinal procedures are generally required for large hemangiomas that have a complex detachment of significant size and elevation. Increasingly, clinicians have also utilized anti-vascular endothelial growth factor compounds, such as bevacizumab and ranibizumab, to treat lesions that have demonstrated resistance to more traditional modalities [2, 3].

Because of the risk of systemic neoplasia and central nervous system vascular tumors, patients with von Hippel–Lindau disease benefit from a multidisciplinary approach, including consultation with medical oncologists, urologists, neurosurgeons, and endocrinologists who are experienced in treating patients with this disorder.

17.3 Circumscribed Choroidal Hemangioma

Circumscribed choroidal hemangiomas are acquired vascular tumors of the choroid. They generally develop in the second to fourth decade of life and have a classic orange pigmentation on ophthalmoscopy. Because of their location and amelanotic features, circumscribed choroidal hemangiomas are often misdiagnosed as metastatic tumors of the choroid.

Circumscribed choroidal hemangiomas are often asymptomatic, but they can present with metamorphopsia and photopsias when associated with subretinal fluid. They demonstrate early hyperfluorescence on fluorescein angiography, but indocyanine green angiography is particularly helpful in making a diagnosis [4]. Indocyanine green angiography demonstrates an intrinsic choroidal vascular pattern that occurs shortly after injection. As the study progresses, there is a significant reduction in the dye's intensity. On A-scan ocular echography, these lesions typically demonstrate high internal reflectivity.

17.4 Management of Posterior Choroidal Hemangiomas

Patients with asymptomatic choroidal lesions do not require treatment and can be monitored. It is best to provide these patients with an Amsler grid and instruct them to monitor their vision closely. Historically, radiation therapy was the treatment of choice for these lesions. Low-dose external-beam radiation therapy can be highly effective in reducing the associated subretinal fluid and tumor thickness. Some patients, however, continue to experience metamorphopsia with limited visual improvement. A number of experts prefer to treat choroidal lesions with plaque

brachytherapy, which provides not only resolution of exudation and reduction of tumor thickness but improved vision. Since the introduction of photodynamic therapy, a number of investigators have commented on the role of this modality in treating these vascular tumors. Photodynamic therapy can result in dramatic reduction and near resolution of some hemangiomas. Increasingly, a number of centers employ this modality as the treatment of choice, using protocols similar to those described for managing choroidal neovascular membranes. Multiple treatments may be required before response and improvement of vision occur [5–9].

17.5 Acquired Vasoproliferative Tumors of the Retina

Acquired vasoproliferative tumors of the retina are known by various names in the medical literature. *Acquired retinal hemangioma* is a term preferred by some oncologists. These lesions may be asymptomatic, but patients often present to the ocular oncologist with decreased vision and photopsias. Acquired vasoproliferative tumors of the retina have a yellowish vascular appearance and are often identified in the peripheral retina. One of the important distinguishing features of these lesions is the presence of associated subretinal exudation and exudative retinal detachment. In some cases, these lesions are misdiagnosed as atypical amelanotic melanomas. A-scan ocular echography can be helpful in distinguishing between these conditions, as most melanomas have lower internal reflectivity than vascular tumors.

With regard to management, patients with asymptomatic lesions can be observed. However, patients with significant exudation or subretinal fluid are generally treated. Most tumors are quite responsive to cryotherapy, which can be applied with a triple freeze–thaw transscleral technique. Large tumors may be resistant to this approach and may require alternative treatment, such as plaque radiation. Following treatment, tumor response can be dramatic—there can be significant reduction in size and resolution of exudation [10–12].

17.6 Conclusions

While vascular tumors of the retina are benign, they often can be associated with various syndromes that harbor neoplastic potential. It is important to identify those lesions that may be associated with neoplastic risk. Most vascular tumors, if asymptomatic, can be observed. Larger lesions are generally responsive to some form of focal therapy, such as cryotherapy or laser photocoagulation. Resistant cases are often amenable to radiation therapy. Increasingly, anti-vascular endothelial growth factor compounds, such as bevacizumab and ranibizumab, show additional promise in treating these intraocular vascular tumors.

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