Primary and secondary tumours of the optic nerve – with emphasis on invasion of uveal malignant melanoma

Jens Lindegaard, MD

This PhD dissertation is accepted by the Faculty of Health Sciences of the University of Copenhagen, and defended on March 23, 2007.

Official opponents: Peter Koch Jensen, Steen Fiil Urbak, and Martine Jager, the Netherlands.

Supervisors: Steffen Heegaard and Jan Ulrik Prause.

Correspondence: Jens Lindegaard, Voldmestergade 26, 2100 Copenhagen, Denmark.

E-mail: jenslindegaard@gmail.com

Dan Med Bull 2007;54:178

ABSTRACT

The PhD dissertation was carried out at the Eye Pathology Institute, University of Copenhagen, and the Department of Ophthalmology, Rigshospitalet, Copenhagen University Hospital. The aim was to investigate tumours of the optic nerve in a known population. Therefore, we studied all surgically removed tumours of the optic nerve in Denmark during a study period of 25 years. Furthermore, in order to elucidate questions of secondary invasion of the optic nerve in uveal melanoma, all eyes enucleated with a uveal melanoma and optic nerve invasion in Denmark between 1942 and 2001 (n=157) were investigated.

Tumours of the optic nerve in children were dominated by optic glioma and invasion from retinoblastoma, whereas tumours in adults mainly comprised optic nerve sheath meningioma and invasion from uveal melanoma.

Optic nerve invasion of uveal melanoma was found in one in 20 patients. Increased intraocular pressure and juxtapapillary location were associated with both prelaminar/laminar and postlaminar invasion of the optic nerve. Furthermore, age older than 70 years, reduced vision to light perception, non-visible fundus and large tumour size were associated with postlaminar invasion. Only patients with optic nerve invasion had metastases to the CNS, kidney and heart.

Histopathological features associated with optic nerve invasion were focal retinal invasion, neovascularization of the chamber angle and scleral invasion. Furthermore, non-spindle cell type and rupture of the inner limiting membrane were all associated with postlaminar invasion.

Most melanomas with invasion of the optic nerve were large juxtapapillary tumours invading the nerve because of their close location to the nerve, but a subcategory of neurotropic uveal melanomas with a diffuse invasive growth pattern was also found. These tumours invade the optic nerve and retina regardless of tumour size and location.

Invasion of the optic nerve had no impact on the prognosis per se, but was seen in association with a series of other prognostic factors (e.g. cell type, extrascleral extension).