**Introduction:** Retinoblastoma research has greatly progressed in the last three decades due to the improved development of animal models that closely resemble the human malignancy. The aim of this study is to assess the pathology of an orthotopic model of retinoblastoma (RNU NIH-Foxn1<sup>rnu</sup> Rat), a T-cell-deficient, athymic nude model, and compare it to the pathology of the human retinoblastoma.

**Material and methods:** The animal model of retinoblastoma was developed in Rowett Nude Rat (RNU NIH-Foxn1<sup>rnu</sup> Rat) a T-cell-deficient, athymic nude model by intravitreous injection of a cultured human tumor cell line (Human Y-79 retinoblastoma cells). The intravitreal growth was monitored daily using confocal laser microscope and the tumour population was quantitatively measured by immunofluorescent techniques. Implanted retinoblastoma cells were isolated to perform further analyses including Western blotting and reverse transcriptase-polymerase chain reaction to confirm that retinoblastoma cells maintained their characteristics as tumour cells even after transplantation and further isolation. Enucleation was performed after 2, 4, 8 and 12 weeks and enucleated globes were formalin-fixed and paraffin embedded for routine pathology evaluation.

**Results:** Reproducible tumor growth was achieved in all animal models injected with Rb cell line-Y79. After 6 to 8 weeks all the animals developed cataract and monitoring became impossible. Microscopic examination of the specimens showed 'blue cell tumors' occupying vitreous cavity and in some cases extending into the anterior chamber. Morphologically, the tumors were composed of small undifferentiated cells with scant cytoplasm and round to oval nuclei showing finely granular chromatin and nucleoli absence. Many mitotic figures and but few apoptotic cells were seen.

In some specimens, cells assumed a linear pattern whereas in others tended to form rosettes. Multiple foci of necrosis and few calcifications were observed. In some specimens, the tumor cells extended extrasclerally and formed a subconjunctival mass. Infiltration of the optic nerve, extending far behind the lamina cribosa, was also registered.

**Conclusion:** Y-79 retinoblastoma cells showed ability of retina, subretinal space, choroid, optic nerve head and anterior chamber invasion, simulating human retinoblastoma in an orthotopic animal model. Animal models are powerful research tools enabling diagnostic and prognostic studies as well as the development of new treatment modalities.