CASE REPORT

Adenoma of the Ciliary Body in a 3-year-old Boy

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SUMMARY

In this paper has been reported a rare case of the ciliary body tumor in 3-year-old boy, which was diagnosed as adenoma of the nonpigmented ciliary body epithelium. The diagnosis was confirmed histologically and immunohistochemically.

Key words: adenoma of the nonpigmented ciliary epithelium, NPCE, tumor of the ciliary body, children

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INTRODUCTION

Adenoma of the non-pigmented ciliary epithelium (NPCE) is an extremely rare benign tumour, which in children is always difficult to differentiate from meduloepethelioma, in adults from amelanotic malignant melanoma of the ciliary muscle or metastases.
In our work we provide information about a case of NPCE in a 3-year-old boy of the Roma origin, who we were able to observe during examination by a slit lamp, together with manifestation of intraocular inflammation and secondary glaucoma. Ultrasonographic examination and nuclear magnetic resonance (NMR) determined a tumour in the area of the ciliary muscle. Histopathological examination confirmed adenoma of the NPCE.

CASE STUDY

Our patient, a 3-year-old boy of the Roma origin had a monthly anamnesis of red-eye, with a deterioration of vision in the left eye. He had no data about previous ocular injury or intraocular disease in his anamnesis. Central visual acuity was on the level of light-sensitivity without localisation and intraocular pressure was 45 mmHg in the afflicted eye.
An examination on a slit lamp determined irritation of the bulb, corneal oedema, flattening of the anterior chamber and pseudohypopyon. The iris was at no. 12 with anterior synechia and the pupil was spread to no. 12. In the area of the root of the iris from no. 12 to no. 1 there were present white tumorous masses and a white oval tumorous formation of the ciliary muscle retroiridially evaginated in artificial mydriasis (fig. 1). The lens was clear and dislocated slightly downwards. With regard to the optical media, it was not possible to assess the fundus.
In the gonioscopic image the iridocorneal angle was at no. 12 to no. 1 with the pressure of the tumour ensuing from the ciliary body, closed along the Schwalbe's line, and a grey resistance 2x3 mm raising the iris shone through from behind the iris.
The tumour was assessed ultrasonographically and by NMR examination. On a B-scan the tumour was acoustically solid, with high internal reflexivity, it was sharply defined with a size of approx. 2x3 mm. The NMR image of the left eye identified expansion of the ciliary muscle in the upper part of the bulb with a size of 2x3 mm, shown as an absence in the liquid content of the anterior chamber of the eye within a scope corresponding to approx. 2x3 mm, in T2w, iso signally with lens in T1w, without restriction of diffusion, after administration of contrast substance with minimal enhancement.
With regard to the clinical picture, a diagnosis of a tumour of the ciliary muscle was determined as suspected medulloepithelioma, and local resection of tumour-iridocyclectomy was subsequently performed. The tumour was completely excised and subsequently pathologically examined. The histological examination excluded meduloepithelioma, but confirmed a diagnosis of adenoma of non-pigmented epithelium of the ciliary body. Due to the formation of a secondary cataract 3 weeks after the local resection

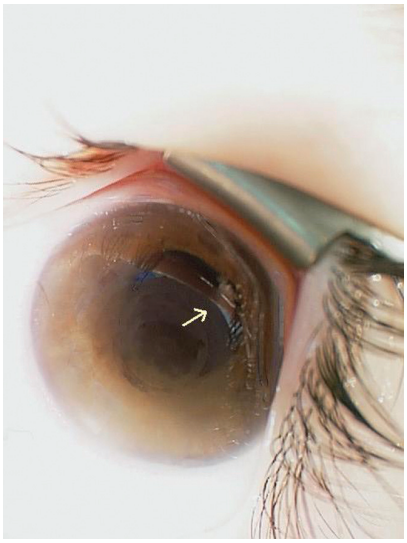

Fig. 1 Image of left eye with tumorous masses behind iris in upper temporal quadrant

of the tumour, we decided upon cataract surgery. Postoperatively visual acuity persisted in the patient on the level of light sensitivity (fig. 2).
With regard to the result of the histological examination on the patient, no further surgical intervention was necessary. Secondary glaucoma with an image of glaucomatous atrophy of the optic nerve was managed by local antiglaucoma treatment.

Pathological-histological image
A bioptic sample was soaked in paraffin after fixation in 4% formaldehyde,

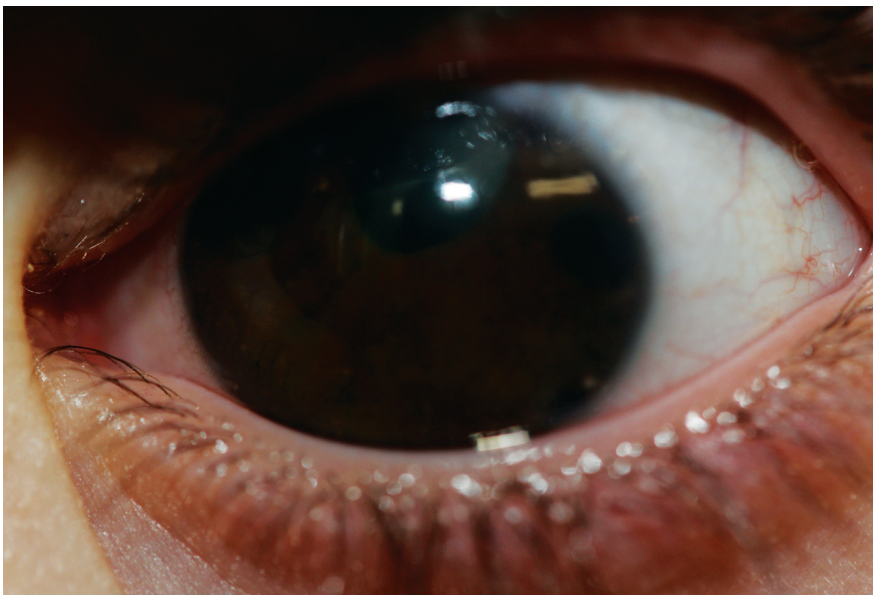

Fig. 2 Image of left eye with total iridectomia at no. 1 after operation

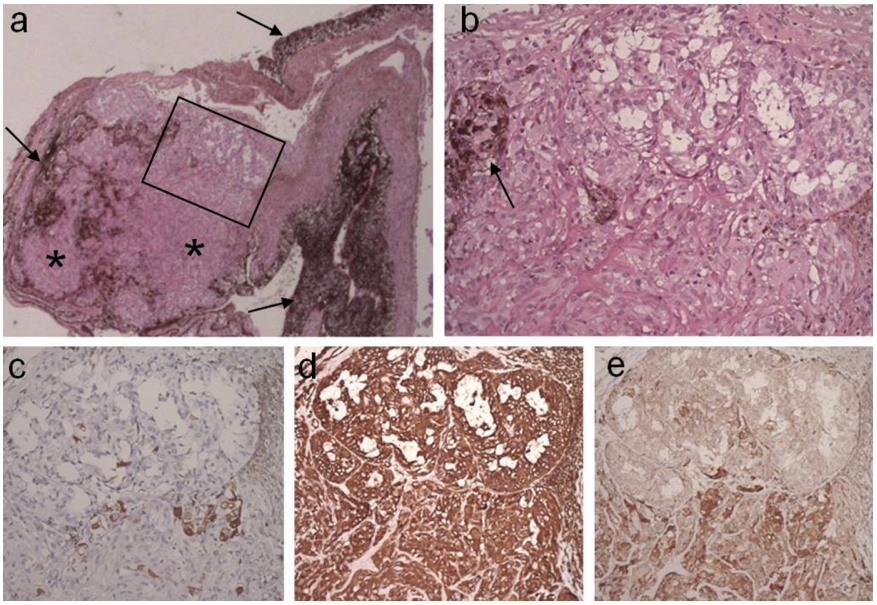

Fig. 3 Adenoma of non-pigmented epithelium of ciliary body. a) Transparent enlargement of deposit proliferation of non-pigmented epithelium of adenoma appearance (*) bordered by pigmented epithelium (→), identified in detail in b) hematoxylin and eosin, 25x, 200x. Immunophenotype of non-pigmented epithelium is with negative expression of cytokeratins c), vimentin-positive d) and varying degree of expression of vascular endothelial growth factor (VEGF) e); 200x

the sections were stained with hematoxylin and eosin, alcian blue and the PAS method. The sections were stained immunohistologically using monoclonal antibodies against cytokeratin (AE1), vimentin, cytokeratin 7 (CK7), VEGF, S100, HMB45, MelanA, epithelium membrane antigen (EMA), chromogranin, synaptophysin, CD 56 and proliferative antigen Ki-67.

In the bioptic sample (fig. 3 a-e), processed by routine paraffin technique after fixation by 4 % formaldehyde, in sections stained with hematoxylin and eosin, the identified fragment of the ciliary body with bordered deposit of glandular proliferation of non-pigmented ciliary epithelium, without atypias and increased mitotic activity, negative staining by PAS method and alcian blue. The tumour cells were immunohistologically positive for vimentin, VEGF, S100 and partially for EMA, negative for AE1, CD7, HMB45, MelanA, synaptophysin, chromogranin, CD56, proliferation index Ki-67 > 1%.

On the basis of the presented findings the lesion was diagnosed as adenoma of the non-pigmented epithelium of the ciliary body.

DISCUSSION

Adenoma of the NPCE was first described by Shields in 1983 (16), and approximately 20 cases in the adult population were subsequently published in the literature.

Primary tumours of the epithelium of the ciliary muscle are rare. We divide them into congenital and acquired. Congenital tumours originating in the embryonic or early postnatal stage are choristomatous malformations of tumours composed of embryonic tissue. In origin they ensue from an undifferentiated medullar epithelium. They include medulloepithelioma and glioneuroma. Acquired tumours originate after the end of the embryonic development, are manifested mostly in adulthood, and originated from fully differentiated tissue of non-pigmented epithelium of the ciliary muscle. They include Fuchs adenoma (hyperplasia of the NPCE, pseudoadenomatous hyperplasia, coronary adenoma), adenoma and adenocarcinoma of pigmented or non-pigmented ciliary epithelium.

Acquired tumours of the epithelium of the ciliary muscle have a wide spectrum of clinical-pathological manifestations (7, 9). Many of them are rare and the majority of published works are composed of individual case studies. Classification is based on the presence or absence of pigment, cell sample and malignant behaviour.

In the differential diagnostics of tumours of the ciliary muscle we must consider amelanotic malignant melanoma, a foreign body, metastases, granuloma, epithelial cyst, hemangioma, schwannoma and leiomyoma. Melanomas mostly have a characteristic mushroom/dome shape. Medulloepithelioma is a congenital tumour occurring within the first ten years of life, and is frequently combined with an image of coloboma, neovascularisation of the iris and symptoms of persisting primary vitreous body. Clinically it is the most difficult to differentiate from adenoma of the NPCE, with far more frequent occurrence. Metastatic carcinoma is more probable in patients with an anamnesis of carcinoma and concurrent metastases, granuloma is always linked to more serious uveal inflammation and the patient may have systematic manifestations of granulomatous inflammation. Less frequent lesions in differential diagnostics, which may present a problem clinically, include ade-

nocarcionma of ciliary pigmented or non-pigmented epithelium, where the difference is based on the degree of histological invasion. Leiomyoma and schwannoma of the ciliary muscle may be clinically impossible to distinguish from adenoma of the NPCE. Differentiation is often possible only after local resection and histologisation.

Adenoma of the NPCE is a benign tumour, most often appearing as a small oval or rounded deposit. It may be asymptomatic (15), but local aggressive behaviour is more frequently manifested. Local symptoms occur, such as intraocular inflammation (2, 17), secondary cataract (2, 4, 6, 10, 11, 17), subluxation of the lens (18), secondary glaucoma (2), vitreous turbidities or haemorrhage, neovascularisation of the optic nerve, cystoid macular edema (19) and epiretinal membrane (8). In patients with adenoma of NPCE painless, definitive loss of sight may often occur.

In diagnostic procedures, the most beneficial are examination by a slit lamp, gonioscopy, fluorescence angiography, ultrasonography, optic coherence tomography, computer tomography and nuclear magnetic resonance (10, 20).

Local resection such as iridocyclectomy or partial sclerouvectomy is an effective method of treatment of benign afflictions, which also definitively assists a histological confirmation of the diagnosis, of which our patient provides evidence.

The tumour (adenoma) cells are arranged in linear groups, fibres and threads, which are aligned lengthwise and separated by septa from the extracellular matrix. The immunohistological results demonstrate the origin from the NPCE: S-100, vimentin and cytokeratin are positive, whereas HB45 antibody is negative (7, 9). In our case the histopathological and immunohistochemical results corresponded to a diagnosis of adenoma of the NPCE (9) and confirmed the origin of a tumour from the non-pigmented epithelium of the ciliary muscle: S-100 and vimentin were positive, immunophenotype of non-pigmented epithelium was with negative expression of cytokeratins. Variable staining for cytokeratin was described in the literature (17) and was also with a varying degree of expression of vascular endothelial growth factor (VEGF). The increased level of VEGF may be a cause of the occurrence of neovascularisation of the disc of the optic nerve and cystoid macular oedema in cases with adenoma of the NPCE (4, 19).

Enucleation is considered only in the case of progressive enlargement of the eye with weak visual function due to uncontrollable secondary glaucoma. Although adenoma of the NPCE may have aggressive local manifestations, following local removal of the tumour there is a small probability of local recurrence. The length of the lives of patients with adenoma of the NPCE is not influenced. Adenoma of the NPCE does not have a tendency to metastasise.

In the literature, occurrence of adenoma of the NPCE in children is extremely rare, and described in only four cases. The authors assume rather a congenital than an acquired origin. In one case a tumour was associated with an iridocorneal cyst and embryotoxon (3). In the second case it occurred precisely in the location of colobomatous defect of the iris and the ciliary muscle, and the author considers the tumour to be a hamartoma – congenital adenoma (12). In the third case, non-pigmented cells were determined in the tumour, identical to the fully differentiated non-pigmented epithelium of the ciliary muscle, and at the same time a quantity of pigmented cells structurally identical to the normal pigmented epithelium of the iris. The presence of these cells indicates that this tumour could have developed intrauterinally during differentiation of the primitive medullar epithelium. However, it differed from other congenital lesions (glioneuroma and medulloepithelioma) in that it was composed of completely differentiated cells. This indicates that the tumour, which began intrauterinally in the primitive medullar epithelium, developed with a division into two fully differentiated cell types (14). In the fourth case, adenoma of the NPCE was manifested by recurring iridocyclitis and the tumour showed positive immune-staining for GFAP (glial fibrillary acidic protein), which is specific for glial cells, specifically astrocytes. Congenital origin is also presumed in three cases of adult patients with adenoma of the NPCE, which was associated with primary hyperplastic primary vitreous (PHPV), where the atrophy of the primary vitreous body could have been breached due to the effect of the tumour, with the development of a secondary vitreous body (1, 5, 13).

CONCLUSION

Adenoma of the NPCE is a rarely occurring tumour of the ciliary muscle in children, which is generally classified amongst acquired tumours with occurrence in adult age. Our rare case in a child patient, previously unpublished in the literature, as well as a further 3 cases in children abroad, indicate that this may represent a congenital tumour. Our experience highlights the current need for a better definition of the clinical picture of adenoma of the NPCE and for doctors to be better informed concerning this diagnosis in differential diagnostics of eye tumours. This differentiation may accelerate timely diagnosis and prevent unnecessary enucleation of the eye due to intraocular benign lesion, which however can be definitively confirmed only by a histological examination.

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