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Unilateral extrafoveal choroidal neovascularization in a 13-year-old child with bilateral optic nerve drusen

Jednostronna pozadołkowa neowaskularyzacja w przebiegu obustronnych druz tarczy nerwu wzrokowego u 13-letniego dziecka

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Streszczenie: Cel: przedstawienie wyników doszklistkowej iniekcji ranibizumabu u 13-letniej dziewczynki z występującą jednostronnie pozadołkową neowaskularyzacją i obecnymi obustronnie druzami tarczy nerwu wzrokowego.
Materiał i metody: u dziewczynki stwierdzono obniżoną ostrością wzroku w oku lewym i druzy tarczy nerwu wzrokowego w obojgu oczach, których obecność potwierdzono badaniem. Angiografia fluoresceinowa i badanie optycznej tomografii komputerowej wykazały obecność błony neowaskularnej naczyniówki w oku lewym. U dziewczynki wykonano iniekcję doszklistkową ranibizumabu. Przebieg choroby monitorowano w badaniu klinicznym oraz badaniach optycznej tomografii komputerowej i angiografii fluoresceinowej.
Wyniki: w ciągu 2 miesięcy uzyskano wygojenie błony neowaskularnej, a najlepsza skorygowana ostrość wzroku poprawiła się z 20/50 do 20/20. Po tym czasie podczas 30-miesięcznego czasu obserwacji ostrość wzroku i obraz dna oka nie uległy zmianie.
Wnioski: druzy tarczy nerwu wzrokowego mogą być uwzględniane jako możliwa przyczyna neowaskularyzacji naczyniówkowej u dzieci i jako takie powinny podlegać starannej obserwacji. Ranibizumab może być stosowany jako skuteczny, choć podawany poza wskazaniami, lek stosowany u dzieci z błoną neowaskularną naczyniówki w przebiegu druz tarczy nerwu wzrokowego.
Słowa kluczowe: neowaskularyzacja naczyniówkowa, druzy tarczy nerwu wzrokowego, ranibizumab.
Abstract: Aim: The aim of our research was to describe the effect of an off-label intravitreal ranibizumab injection for treatment of unilateral extrafoveal choroidal neovascularization a with bilateral optic nerve drusen.
Material and methods: 13-year-old girl presented with decreased visual acuity of her left eye and optic nerve drusen confirmed by B-scan ultrasound examination in both eyes. Fluorescein angiography and optical coherence tomography revealed the presence of choroidal neovascularization in the left eye. The patient was treated with a single injection of ranibizumab and monitored by clinical examination, optical coherence tomography and fluorescein angiography.
Results: Choroidal neovascularization was successfully treated and the best corrected visual acuity (Snellen) fully recovered from 20/50 to 20/20 over a period of 2 months. After this time at the 30 months follow-up, visual acuity and fundus were stable without the recurrence of choroidal neovascularization.
Conclusions: Optic nerve drusen should be taken into account and carefully observed as a possible cause of peripapillary choroidal neovascularization in children. Ranibizumab can be a successful off-label treatment in children suffering from choroidal neovascularization associated with optic nerve drusen.
Key words: choroidal neovascularization, optic nerve drusen, ranibizumab.

Introduction

Choroidal neovascularization (CNV) is a rare condition characterized by the growth of new choroidal blood vessels passing through the damaged Bruch's membrane or the basement membrane of the retinal pigment epithelium (RPE) into the subretinal space.

The age related macular degeneration (AMD) – the leading cause of blindness among elderly people in Europe – is the most common cause of CNV in adults. In younger adults CNV stems from variable causes: pathologic myopia, chorioretinitis (ocular histoplasmosis syndrome, ocular toxoplasmosis or toxocariasis, sarcoidosis, chronic uveitis, Voght-Koyanagi-Harada syndrome), angioid streaks, or choroidal rupture. It can also be idiopathic. CNV in children can be associated with macular dystrophies such as Best's disease or optic nerve drusen (OND) (1, 2). Kaeser and Borruat also reported a case of peripapillary neovascular membrane as the initial and only symptom of papilledema secondary to idiopathic intracranial hypertension (3). Some CNVs in childhood are idiopathic (4). Although few CNVs show spontaneous involution, others can compromise macular function by serous or serous-hemorrhagic retinal detachment, subretinal exudation or subfoveal extension of the CNV (5). In our patient we found extrafoveal neovascularization. The patient underwent diagnostic process and optic nerve drusen appeared to be the only reasonable cause of neovascularization.

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Aim

Our aim is to present the results of ranibizumab injection in this type of neovascular membranes in children.

Material and methods

13-year-old otherwise healthy girl presented to our clinic with reduced visual acuity in her left eye lasting for one month. Her bestcorrected visual acuity was 20/50 in the left eye and 20/25 in the right eye. She demonstrated +8.5 Dsph hyperopia and +0.5 Dcyl astigmatism in both eyes.

Slit lamp examination of the anterior segment was within normal limits and intraocular pressure in both eyes was normal. The results of visual field testing were normal in right eye, while the blind spot enlargement was present in the visual field of the left eye. Amsler grid testing of the left eye showed a central scotoma. Ocular fundus examination of the left eye revealed optic disc elevation, macular edema, whitish extrafoveal spot in the papillomacular bundle and subretinal hemorrhage in the papillomacular bundle and in the macula (Fig. 1.). The fundus of the right eye was normal.

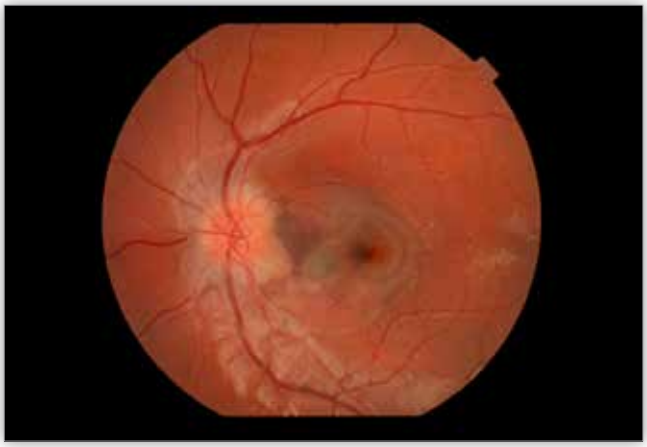

Fig. 1. The color image of the left fundus – macular edema with subretinal hemorrhage and extrafoveal whitish spot in the papillomacular bundle.
Ryc. 1. Kolorowe zdjęcia dna oka lewego – obrzęk plamki z krwotokiem podsiatkówkowym i szarą, pozadołkową zmianą w pęczku plamkowo-tarczowym.

In the optical coherence tomography subretinal fluid suggesting the active choroidal neovascular membrane was shown in the left eye (Fig. 2.).

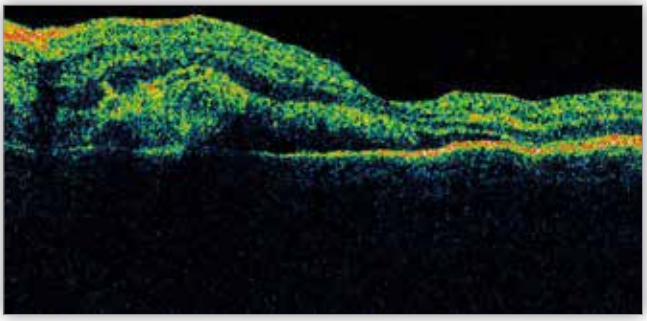

Fig. 2. OCT of the left eye – subretinal fluid and choroidal neovascular membrane.
Ryc. 2. OCT oka lewego – płyn podsiatkówkowy i błona neowaskularna.

Fluorescein angiography revealed subretinal hemorrhage and well-defined, circular extrafoveal subretinal CNV in the left eye (Fig. 3a., b.), with no abnormalities in the right eye.

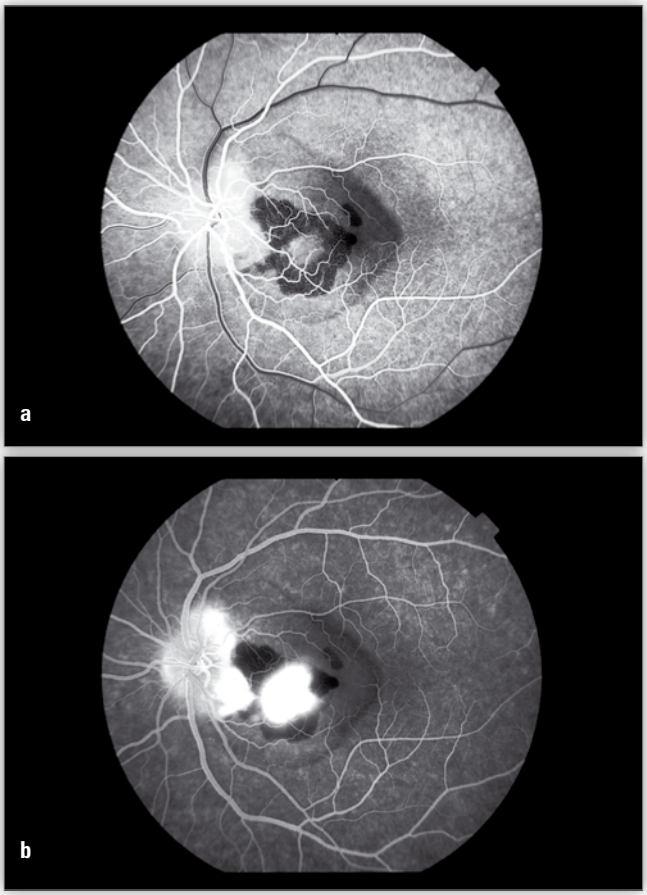

Fig. 3a., b. Early (a) and late (b) phase of the FA of the left eye showing choroidal neovascularization.
Ryc. 3a., b. Wczesne (a) i późne (b) fazy angiogramu oka lewego wskazujące na neowaskularyzację naczyniówkową.

Optic disc drusen were shown in B-scan ultrasound examination of both eyes, although they were located deeper and very small in the right eye.

The intravitreal ranibizumab injection 3.5 mm posterior to the limbus in the left eye was performed under the general anaesthesia. The research was approved by a local institutional review board.

Results

One month after the injection, the visual acuity improved from 20/50 to 20/25, central macular thickness was reduced, and sub- and intraretinal fluid was partially resorbed, which was confirmed by OCT. Two months after the injection the visual acuity improved to 20/20. Ophthalmoscopy and OCT showed a complete resolution of the subretinal fluid and macular edema (Fig. 4.).

The fibrotic tissue located between the optic disc and the macula is visible in fluorescein angiography with no signs of activity and recurrence of CNV (Fig. 5.).

30 months following the injection, the patient's vision remains stable at 20/20, and the macular appearance is stable without the recurrence of subretinal fluid.

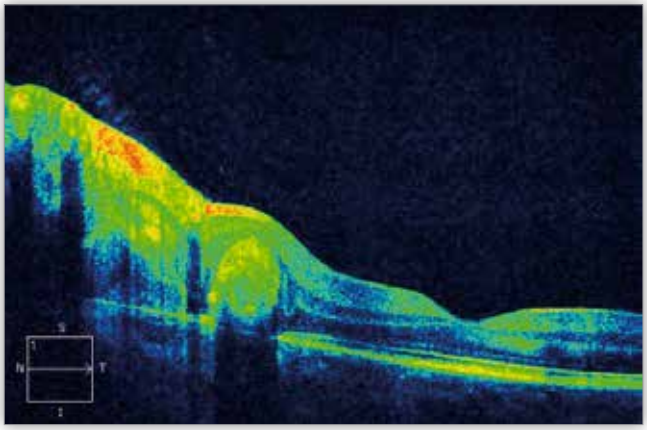

Fig. 4. OCT of the left eye 1 month after ranibizumab treatment, showing the fibrotic tissue without the subretinal fluid.
Ryc. 4. OCT oka lewego po leczeniu ranibizumabem – tkanka bliznowata bez płynu podsiatkówkowego.

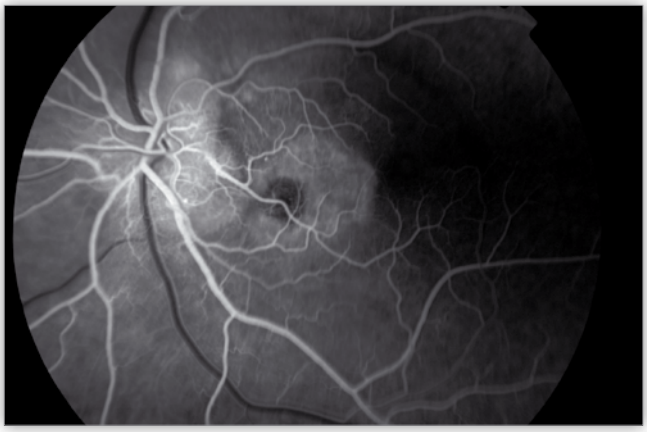

Fig. 5. FA of the left eye 1 month after ranibizumab injection without early-phase leakage, showing the hypofluorescence caused by the fibrotic tissue with pigment in the area of previous hyperfluorescence.
Ryc. 5. AF oka lewego 1 miesiąc po iniekcji ranibizumabu: bez przecieku, z hipofluorescencją spowodowaną obecnością tkanki włóknistej z barwnikiem w miejscu uprzedniej hiperfluorescencji.

During this period, no complications or adverse reactions to ranibizumab were noted.

Discussion

Optic nerve drusen (OND) are a common cause of pseudopapilledema. Optic nerve drusen can also cause other complications, for instance anterior ischemic optic neuropathy, central retinal artery/r vein occlusion, visual field defects and subretinal hemorrhages (2, 5–7). The OND-associated diseases are: retinitis pigmentosa, angioid streaks and Alagille syndrome (2).

CNV caused by optic nerve drusen is a rare cause of vision loss in young patients. The first case of CNV caused by the OND in children was reported by Gass (8). We suggest that peripapillary circulation impaired by OND may cause optic nerve ischemia and rupture of the Bruch membrane, which stimulates CNV formation.

Choroidal neovascularization is classified according to its relation to the fovea: subfoveal, juxtafoveal and extrafoveal (2, 5). The neovascular membrane can be asymptomatic unless the macula is involved. CNV can cause central vision loss in several mechanisms: subfoveal location, subretinal hemorrhage, exudative macular detachment and cystoid degenerative changes of neurosensory retina (2, 5).

The treatment of CNV depends on its location. Different treatment options have been described for children with CNV: observation due to the possibility of spontaneous involution of CNV (9), thermal laser photocoagulation of CNV located at a distance from the fovea (10) and photodynamic therapy or submacular surgery for subfoveal CNV. The improvement of visual acuity after verteporfirin therapy or submacular surgery in children has been described in a few reports (11, 12). The treatment of CNV caused by OND has also been described. Delyfer et al. reported visual acuity improvement after laser photocoagulation in patients with bilateral choroidal neovascularization secondary to OND (13).

Antivascular endothelial growth factor agents are widely used for treatment of choroidal neovascularization in adults. There are reports describing use anti-VEGF agents in children in Best disease (14) and posttraumatic neovascularization (15). These cases suggest that anti-VEGF treatment can be effective in pediatric CNV secondary to a variety of causes.

Ranibizumab is currently the world most widely used approved treatment of subretinal neovascularization in age-related macular degeneration, diabetic retinopathy and other neovascular diseases in adults. There are no approved drugs for similar pathologies in children. The anti-VEGF therapy should be considered individually after a careful risk-benefit analysis and a discussion with parents about the possible side effects. The safety of this therapy in children has not been established.

It should be noted, that no treatment of young patients with CNV may lead to subretinal macular scarring or cause permanent visual impairment. That is why we decided to treat CNV in our patient with an anti-VEGF injection. Due to the location of the CNV in our patient and the subretinal hemorrhage, it was not possible to use other treatment methods such as a laser therapy.

Conclusion

The results of our research support the concept that ranibizumab injection can be safe and effective in children with CNV secondary to optic nerve drusen, although one should bear in mind that the use of these agents in children is still an "off label" treatment.

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