RETINAL HEMORRHAGES AS ONE OF COMPLICATIONS OF OPTIC DISC DRUSEN DURING PREGNANCY

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Summary
Introduction. Drusen of the optic nerve head are relatively benign and asymptomatic. They represent retinal hyaline corpuscles resulting from impaired axoplasmic transport of the retinal ganglion cells of optic nerve in front of the lamina cribrosa. They are usually detected accidentally, during a routine ophthalmologic examination. Most patients with optic disc drusen are not aware of the deterioration of their eyesight because of the slow progression of visual field defects. Damage in visual acuity due to optic disc drusen is rare. Case Report. A 27-year-old female patient in the sixth month of pregnancy visited an ophthalmologist because of a visual impairment described as the appearance of mist and shadows over her right eye. When first examined, her visual acuity in both eyes was 20/20. The retinal hemorrhages framing the bottom half of the optic nerve were seen. Complete laboratory and clinical testing as well as specific ophthalmic examinations (photofundus, computerized visual field, optical coherence tomography, and ultrasound) were performed to exclude systemic causes and they presented no risk for the pregnancy. Echosonographic examination confirmed the presence of bilateral optic nerve head drusen. Conclusion. Hemodynamic changes during pregnancy are possible factors for the development of optical disc and retinal hemorrhages. Since treatment of optic disc drusen is limited, recognition of optic nerve were seen. A cause of hemorrhage during pregnancy prevents unnecessary diagnostic and therapeutic interventions.

Key words: Retinal Hemorrhage; Pregnancy; Optic Disk Drusen; Female; Adult; Early Diagnosis; Pregnancy Complications, Hematologic

Introduction
Drusen of the optic nerve head are relatively benign and asymptomatic. They represent retinal hyaline corpuscles resulting from impaired axoplasmic transport of retinal ganglion cells of optic nerve in front of the lamina cribrosa [1, 2]. They are usually detected accidentally, during a routine ophthalmologic examination. They are more frequent in women and Caucasians [3]. The prevalence of optic disc drusen (ODD) is between 3.4 and 24 per 1000 population [4–6].

They can cause peripheral visual field defects in 71% to 75% of the eyes. Clinical findings do not tend to deteriorate in most patients. Many theories explain the changes in the visual field, such as the direct compression on the axons of ganglion cells, ischemia of the optic nerve, a small scleral canal and impaired axonal transport [7]. The most common defects in the visual field are scotomas, particularly in the lower nasal quadrant, the extension of the blind spots and concentric narrowing of the visual field [8, 9]. However, these incidents are not correlated with the position of ODD in the optic disc.
nerve head [9–12]. Large defects in the visual field and a reduction of central visual acuity are rare [10]. The only problems that patients notice are arcuate scotomas as the major cause of reduced vision [10–12]. Most patients with drusen are not aware of the deterioration of their sight because the slow progression of visual field defects.

In addition, ODD may cause anterior ischemic neuropathy, central retinal vein occlusion, repeated episodes of transient vision loss, optic nerve atrophy, venous occlusion, juxtapapillary choroidal neovascular membrane formation leading to subretinal hemorrhage and other complications [4, 7, 9, 11]. Unlike superficial drusen, the deep ones closer to lamina cribrosa are often associated with vascular changes on the optic nerve head because of greater compressive effect [9, 10].

Case Report

A 27-year-old female patient in the sixth month of pregnancy visited an ophthalmologist because of a visual impairment described as the appearance of mist and shadows over her right eye. When first examined, the visual acuity in both eyes was 20/20 according to Snellen charts, and the intraocular pressure was 17 mmHg bilaterally. Clinical examination on the slit lamp was uneventful. The fundus examination of the right eye revealed the swollen optic nerve head up to 1 diopter, the blood partly covered the lower half of the optic disc circular in shape, the size being of about 1.5 of papilla diameter, partly in layers of the retina and partly in pre-retinal parts. The veins were fuller. The rest of the retina was neat. The fundus examination of the left eye revealed a discretely swollen optic nerve head up to 0.5 diopter. Other findings were within the reference range (Figure 1).

The differential diagnosis included thrombosis of the central retinal vein branch or papillophlebitis. The patient was asked to undergo testing of complete blood count and phospholipid status, screening of coagulation factors, computerized visual field, optical coherence tomography of fundus, and check-up by the neurologist with nuclear magnetic resonance of endocranium. Fundus fluorescein angiography, which could have provided a definitive diagnosis, was contraindicated because of her pregnancy.

The results of blood biochemical analysis were within reference range, except for total cholesterol, which was 6.22 mmol/l (3.90 to 5.20). Virological tests (immunoglobulin M-IgM and immunoglobulin G-IgG for Coxsackievirus, Adenovirus, herpes simplex virus 1) were negative, except for IgG, which was positive for adenovirus and HSV 1. Immunological features of the different antibodies were negative (anti-mitochondrial, anti-cardiolipin, anti-phospholipid IgG and IgM, anti-β2-glycoprotein 1). Vascular and coagulation profiles and lupus anticoagulants showed no pathological significance. The results of color Doppler sonography of blood vessels of the lower extremities as well as magnetic resonance imaging of endocranium were within the physiological findings. Neurological examination was normal. Therefore, there were no systemic causes of retinal hemorrhage in the right eye, and both the mother and fetus were protected from additional systemic complications except for uncertain outcome regarding the right eye vision because of unclear etiology.

Computerized visual field (Optopol, Sp.z.o.o., Zawiercie, Poland; glaucoma, fast threshold) was done on the day of first examination and revealed bilateral visual field defects, although the patient was not aware of visual loss in her left eye. The Bjerrum relative scotoma in the formation was seen as well as Rene’s nasal step, which corresponded to the localization of retinal hemorrhages in her right eye. The visual field of the left eye showed the decrease of sensitivity of the retina, pericecal scotoma, and absolute and relative scotomas in the nasal Rene’s zone (Figure 2).

Optical coherence tomography (OCT; Cirrus HD-OCT, Zeiss, Meditec, CA; retinal nerve fiber layer (RNFL) and optic nerve head test) showed an asymmetry in findings of the right and left eye, with the preservation of RNFL thickness, the neuroretinal rim thickened on the right eye due to extravasation and accumulation of fluid (Right eye Avg. RNFL Thick. 198 μm, Left eye 81 μm) (Figure 3).
After three weeks of therapy with anticoagulants (0.3 ml nadroparin calcium 9,500 anti-Xa IU/ml daily) and antioxidants (500 mg vitamin C daily), hemorrhages resolved spontaneously. Visual acuity was 20/20 in both eyes, the intraocular pressure 15 mmHg. A new fundus image was done, which showed drusen of the optic nerve head, which were no longer masked by hemorrhages. The ultrasound examination of both eyes (B scan; Ultrasound A/B Scanner, UD-6000, Tomey Corp. USA) revealed a prominent, highly reflecting signal to the optic nerve bilaterally, confirming the diagnosis of drusen bilaterally (Figure 4).

Further monitoring of the patient after delivery, i.e. 10 months after the bleeding episode, included specific ophthalmologic examinations. The repeated OCT indicated the bilateral neuroretinal rim thickening and thinning of the peripapillary RNFL. Peripapillary RNFL of the right eye (Average RNFL Thickness 51 μm) was thinner in the superior (71 μm), inferior (52 μm) and temporal (34 μm) and nasal quadrant (48 μm). RNFL of the left eye (Average RNFL Thickness 82 μm) was thinner in the superior (66 μm) and nasal quadrant (49 μm). OCT showed macular thinning of the retinal nerve fibers in the superior, nasal and inferior quadrants of the right eye, while the contours of the fovea were bilaterally preserved and the central thickness of the fovea was normal (211 μm in the right eye and 216 μm in the left eye) (Figure 5).

Static perimetry (Humphrey Visual Field Analyzer, HFA, SAD; Threshold test C 30-2) revealed defects in the visual field of the right eye, blind spot enlargement, absolute central scotoma, absolute and relative paracentral scotoma (MD -9.08 dB, PSD 8.09 dB). The left eye findings indicated relative and absolute paracentral and nasal scotoma in the “pattern” deviation (MD -2.10 dB, PSD 3.20 dB) (Figure 6). Computerized visual field and optical coherence tomography showed permanent damage of the retinal nerve fibers due to bleeding and compression.

**Discussion**

Optic disk drusen are usually benign phenomena with well-preserved visual acuity. Patients often fail to perceive them since the central visual field loss is rare and it can occur due to hemorrhages of the optic disc, peripapillary retinal or vitreous hemor-
rhages, or ischemia which affects the retina or the optic nerve [2–7, 11, 12]. The diagnosis can be made only by ophthalmoscopy, although numerous additional differential diagnostic tests are available. Patients with optic disc drusen should be regularly monitored for possible complications because drusen may vary in their appearance and position throughout the life of the patient, from those deeply immersed in the optic nerve to the ones placed on the surface of the nerve [12–14].

The prevalence of retinal hemorrhages in patients with ODD is from 2% to 10% [15–18]. Sanders et al. distinguish four types of bleeding in relation to ODD: 1) small, transient, asymptomatic splinter hemorrhages on the head of the optical disc; 2) bleeding from the head of the optic nerve extending into the vitreous body and causing transient symptomatic defects in the visual field; 3) deep papillary hemorrhage, and 4) deep peripapillary hemorrhage that can affect the region of the macula, accompanied by severe visual impairment and permanent defects in the visual field [16, 19].

In most cases, retinal hemorrhages are detected accidentally, without the deterioration of visual acuity and no subretinal neovascularization, because the involvement of the macula and vision impairment are less frequent [17, 18, 20].

The pathological mechanism of bleeding in patients with ODD is not sufficiently understood; it may be due to erosion of the vessel wall because of the expansion of disk drusen or a change of the drusen position, the blood congestion or ischemia [18–21]. In addition, ischemic effect of drusen enlargement can stimulate proliferation of blood vessels at the border of the optic disc between the Bruch membrane and the pigment epithelium, whose rupture can produce profound peripapillary hemorrhages. A retinal hemorrhage described in a nine-year-old boy with ODD during a tennis match was attributed to physical stress, while in another patient bleeding on the optical disc happened during a migraine attack [22, 23]. Rozemberg studied a large series of 250 eyes with ODD and reported two young patients, aged 4 and 12 years, with submacular hemorrhage.

All types of vascular occlusions have been described in the eyes with ODD and they are generally considered to be caused by vascular compression of the optic nerve head or inside it. They should be treated as the cases without drusen [18, 19]. Submacular hemorrhages in cases with ODD and peripapillary subretinal neovascular membrane generally have a good prognosis for visual acuity and should not be treated by laser. Photocoagulation is indicated only if the visual acuity is compromised [21, 23]. Boldt et al. reported six out of 48 patients with ODD who had vascular occlusion at the level of the optic disc [20, 22–24]. A case of central retinal vein occlusion associated with hormonal contraception was reported.

There is no cure for ODD and the basic approach is monitoring of visual acuity and its loss or following complications such as elevated intraocular pressure or subretinal neovascularization if they develop. Monitoring involves fundus photographs, measuring the thickness of the retinal nerve fiber layer and computerized visual fields. When there are defects in the visual field caused by ODD, regular tonometry and computerized visual fields are mandatory, as these patients are predisposed to have their nerve fibers damaged and they are sensitive to elevated or even normal intraocular pressure [25–28]. Antiglaucomatous drugs should be used in such a case. Occlusive antihypertensive agents have been suggested as a prophylaxis to prevent the loss of nerve fibers, and further damage of the optic nerve [27–29].

It is well known that pregnancy causes blood hypercoagulability and pregnant women may be at risk of developing systemic thrombosis and other vascular disorders (Schafle 1985). In patients with large defects in the visual field caused by ODD, a low-dose, systemic, antiplatelet agents can be introduced to prevent possible ischemic events prior to pregnancy [30]. This treatment during pregnancy is safe and can reduce the incidence of bleeding complications [27, 31].
Conclusion

Hemodynamic changes during pregnancy are possible factors affecting the development of optical disc and retinal hemorrhages. Although the literature describes the radial neurotomy fiber optic nerve decompression, there is no established therapeutic treatment for optic disc drusen. Knowing that the treatment of optic disc drusen is limited, the recognition of optic nerve drusen as a cause of hemorrhage during pregnancy prevents unnecessary diagnostic and therapeutic interventions.

References