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Causes of visual disablility in children and young adults

Przyczyny obniżenia ostrości wzroku u dzieci i młodzieży

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Summary: Purpose: Blindness and visual disability is a great problem all over the world. Loss of visual acuity in children requires special attention. The aim of the study was to determine the causes of uni- and bilateral low vision in children and young adults. Patients were from our clinic and from the School for the Blind and Visually Impaired in Lodz.
Material and methods: The study group included 271 patients aged from 3 months to 21 years, visually disabled and with uniocular reduction of visual acuity to 25% or less.
Results: The commonest cause of low visual acuity in the group was optic nerve atrophy (22%) due to perinatal hypoxia. Other important causes were retinopathy of prematurity (17%) and congenital abnormalities of the eye globe (11%). The main causes of uniocular low vision were anisometropia and strabismus.
Conclusions: The main cause of visual impairment and disability in the study group from our region was optic nerve atrophy. Retinopathy of prematurity was also frequently seen in the handicapped children and was responsible for severe visual loss. Anisometropia and strabismus were predominant causes of uniocular visual deterioration, but not of visual disability.
Słowa kluczowe: niepełnosprawność wzrokowa, ROP, zanik nerwu wzrokowego.
Key words: visual disability, ROP, optic nerve atrophy.

Blindness and visual disability is a great problem all over the world (1). There are three grades of visual disability in our country. Patients with visual acuity 0.05 or less in better eye with full correction and those with visual field narrowing up to 20° are numbered among severe visually handicapped. Moderate visual disability is interpreted as visual acuity from 0.06 to 0.1 in better eye or narrowing of visual field to 30°. Patients with binocular aphakia, one-eyed persons and those with visual acuity less or equal to 0.25 in better eye with adequate correction are ranked among mild visually handicapped.

Aim of the study

The aim of the study was to determine types and frequency of causes of visual loss in children and teenagers, patients of the Department of Pediatric Ophthalmology at Medical University in Łódź, our outpatient clinic and pupils from the School for the Blind and Visually Impaired in Łódź.

Material and methods

The study group consisted of 271 children aged from 3 months to 21 years, with uni- or binoculary visual impairment at least 0.25. 181 patients who fulfilled visual disability criteria were selected from this group. During the investigation all available data of each case history were collected. Ophthalmic examination included visual acuity testing with the use of Snellen test charts in children aged more than 3 years. In younger ones pupillary light reactions and following light and objects with eye movements were tested. The anterior and posterior segments were examined in every child. Additional tests like: visual field and colour vision testing, intraocular pressure measuring were carried out if necessary.

Results

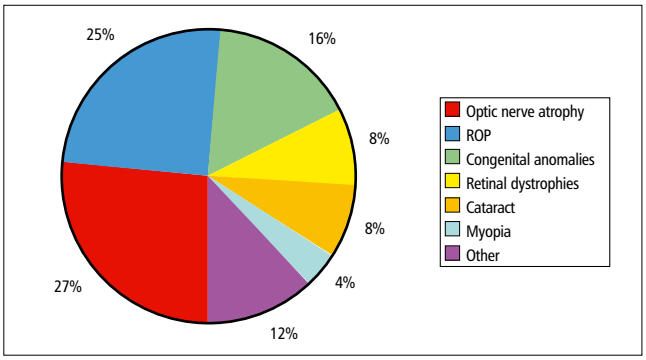
In group of 181 visually handicapped children optic nerve atrophy was seen most frequently. It occurred in 49 patients (27%). Optic nerve atrophy was a consequence of ischemic encephalopathy, post-haemorrhagic or post-inflammatory hydrocephalus in 22 children. Atrophy was associated with intracranial tightness syndrom, microcephaly or Crouzon's dysostosis (in 4 cases). In seven cases optic nerve atrophy was the effect of trauma or retrobulbar neuritis. In 16 remaining children no possible cause could be detected.

Retinopathy of prematurity was seen in 46 children (25.4%), moreover, in 37 ROP was the cause of severe visual disability. 6 children were moderately visually handicapped and 3 more had mild visual disability due to ROP.

The next group consisted of 29 children with congenital anomalies of the eye globe (16%). Coloboma was the commonest (9 patients). Microphthalmia as well as persistent hyperplastic primary vitreous were seen in 7 children. Other congenital anomalies were: aniridia (4 cases), choroidal haemangioma in Sturge-Weber's syndrom (1 case) and congenital anophthalmia (1 case).

Other causes of visual disability were retinal dystrophies and cataract, both with the same frequency (15 children). There were 7 cases of Stargardt disease and 6 cases of retinitis pigmentosa. One boy presented some characteristic signs of Lawrence-Moon-Biedl syndrome: obesity and mental retardation.

High myopia was observed in seven children. Other causes were seen rarely, each with the prevalance of less than 2%. The results are presented in fig. 1.

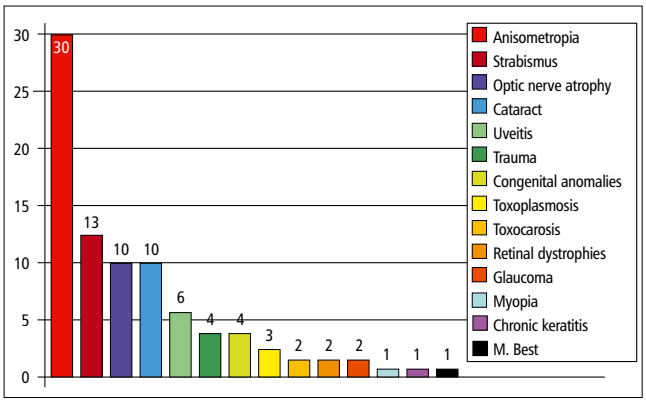


Ryc. 1. Przyczyny zaburzeń widzenia w badanej grupie.
Fig. 1. Causes of visual disability in the study group.

Three grades of visual disability were considered separately. 99 children were severely visually handicapped. In that group as many as 37 children had ROP, 31 had optic nerve atrophy and 16 – congenital anomalies of the eye globe. Causes of severe visual disability in the study group are shown in tab. I.

Moderate visual disability was seen in 34 patients. In that group retinal dystrophies were the commonest cause of visual impairment (tab. I).

Mild visual disability was observed in 48 cases. Visual loss was caused mostly by optic nerve atrophy, congenital anomalies, cataract, high myopia. Retinopathy of prematurity was the fifth most common cause of disability in that group (fig. 4).



Ryc. 2. Przyczyny jednoocznego widzenia 0,25 lub mniej.
Fig. 2. Causes of uniocular visual impairment to 0.25 or less.

The causes of uniocular visual loss among children not qualified for visually handicapped were also considered. This group numbered 90 patients with visual acuity of one eye less or equal to 0,25. This impairment was mainly the effect of anisometropia and strabismus (43 children), which was expected. Optic nerve atrophy, cataract and uveitis were seen frequently. There was not a case of ROP in that group (fig. 5).

	Severe visual disability		Moderate visual disability		Mild visual disability	
Cause	**Number of children**	**Percentage**	**Number of children**	**Percentage**	**Number of children**	**Percentage**
optic nerve atrophy	31	31%	8	23,6%	10	20,9%
ROP	37	37,35%	6	17,7%	3	6%
congenital anomalies	16	16,25%	5	14,8%	8	16,6%
retinal dystrophies	4	4,05%	9	26,5%	2	4,2%
cataract	5	5,1%	3	8,7%	7	14,6%
myopia	1	1,05%	2	5,8%	4	8,3%
toxoplasmosis	1	1,05%	1	2,9%	1	2,1%
uveitis	1	1,05%			2	4,2%
retinoblastoma	1	1,05%			2	4,2%
glaucoma					2	4,2%
anisometropia					1	2,1%
trauma					2	4,2%
cortical blindness	2	2,05%				
toxocarosis					1	2,1%
astigmatismus					1	2,1%
Total	**99**	**100%**	**34**	**100%**	**48**	**100%**

Tab. I. Przyczyny obniżenia widzenia w badanej grupie.
Tab. I. Causes of visual disability in the study group.

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Discussion

Causes of blindness and severe visual impairment differ in various world regions. The most numerous group -75% of all 1.5 million blind children in the world, live in Africa and Asia. In the developing countries main causes of blindness are corneal scarring due to measles, vitamin A deficiency or onchocercasis (river blindness) – caused by parasite Onchocerca volvulus (1,2). These problems do not occur in Poland. Furthemore in these countries blindness is avoidable in almost $^3/_4$ cases (e. g. by vitamin A supplementation, immunisation, elimination of insect – vectors of arthropod-borne inflammation). Cataract is also frequent (3,4). Congenital cataract is significantly commoner in Africa and Asia than in Europe: in Africa – 23.5% (5), in Mongolia – 34% (6), in the Czech Republic – 8% (7). In our group cataract was seen in 8.3% children. Congenital anomalies of the eye globe such as coloboma, microphthalmia, anophthalmia are the next group of causes responsible for visual loss in children. Hornby et al. described different congenital abnormalities in a group of 7 thousand children with blindness and low vision from 26 countries and different continents (8). 10.7% had microphthalmia, 2.3% anophthalmia and 1.3% coloboma. Prevalence of congenital anomalies of eyeball was higher in Asiatic countries which was connected with parents consanguinity, vitamin A defficiency and exposure to pesticides during pregnancy (9). In our study group congenital abnormalities were observed in 16% patients.

In high-income countries optic nerve atrophy and hypoxemic/ischemic changes of central nervous system in perinatal period dominate (10,11). It seems to be an effect of improving survival of the newborns with perinatal hypoxia. Trauma, retrobulbar neuritis or intracranial pression are rare causes of optic nerve atrophy. In visually handicapped children from our group it was also the most frequent diagnosis (27%).

ROP is also an important factor. It was the second main cause of visual disability (more than 25% patients). Interestingly the occurrence of ROP and its significance has been rising in recent years (12). Retinopathy of prematurity is one of most important factors contributing to blindness in Europe, America and Asia. In African countries on the contrary this problem does not exist. It is connected with survival rate of premature newborns.

Causes of blindness in different regions of Poland were analized in the seventies. Unfortunetely there was very little information about the cause of blindness in children, although some interesting data concerning young adults under 30 years of age, can be found. According to Hańczyc et al. the most frequent causes of visual disability in this age group were high myopia (26%) and congenital cataract (21%). Corneal (13%) and optic nerve diseases (11.8%) were seen less frequently (13). Rudobielski et al. reported congenital cataract being the main cause of 1st degree visual disability in young adults (under 30 years of age). Other causes were microphthalmia (13%), optic nerve diseases and injuries (both 12%). 2nd degree visual disability was mainly due to congenital cataract (51%) and retinal diseases (12.7%) (14). High myopia was the main aquired pathology causing blindness, while congenital cataract was the most frequent congenital anomaly in the group of 400 patients, aged 18-65 years analized by Paluchiewiczowa (15).

Conclusion

The main cause of visual impairment and disability in the study group from our region was optic nerve atrophy. Retinopathy of prematurity was also frequently seen in the handicapped children and was responsible for severe visual loss. Anisometropia and strabismus were predominant causes of uniocular visual deterioration, but not of visual disability.

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