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The occurrence of primary open angle glaucoma in a family

Glaucoma is one of the leading causes of blindness in the world. It is a progressive optic nerve neuropathy in which one of the most important risk factors is the increased level of intraocular pressure, although the disease also occurs in patients with correct intraocular pressure as well. At present 64 million people world-wide suffer from glaucoma, of which 33 million suffer from primary open glaucoma (POAG). Therefore, this disease affects 2% of the world's population over the age of 45 (4, 6).

Around 50% of POAG is genetically determined. A multitude of clinical observations of families in which glaucoma are present, has shown that a 10% chance of glaucoma occurrence exists for siblings, with a further 4% chance of occurrence for their future children. Glaucoma, like Alzheimer's, asthma, diabetes, cancer, atherosclerosis and age-related muscular degeneration belongs to a group of diseases caused by more than one gene, or by a combination of genetic and environmental factors, which render the identification of the suspected gene difficult (3, 5).

Identifying the gene responsible for glaucoma has been of great interest to many research teams. The clinical, genetic and epidemiological analysis of families contributes to the information gathered on the ways in which glaucoma is inherited. A study of 47 members of a three-generation family was carried out, in which POAG was diagnosed as being present, and transmitted according to autosomal dominant pattern with strong penatrance (2). The autosomal dominant transmission of POAG was also described by Angius and occurred in a few Italian families (1).

In 2002 a study was published, describing 54 families in which autosomal dominant transmission of POAG was diagnosed. The identification of the causative gene on chromosome 10p14 took place and was designated as OPTN. Sequence mutations were found in 16.7% of families with POAG. Optineurin (66kDA) a protein which is a product of this gene, is attributed to have neuroprotective functions in the eye and optic nerve. In cases of the incorrect structure of this protein we observe an occur-

rence of optic nerve neuropathy characteristic of glaucoma, with correct intraoccular pressure, as well as in cases where the intraoccular pressure is high (4).

OBJECTIVE

The aim of this study is to present the case of four generations of a family in which eight members were diagnosed with POAG.

MATERIAL AND METHODS

Since 1982, in the 2nd Department of Ophthalmology in Lublin, there have been studied four generations of a family in which eight members were diagnosed with POAG (Fig. 1). Two members of this family have been deceased for some time, there-

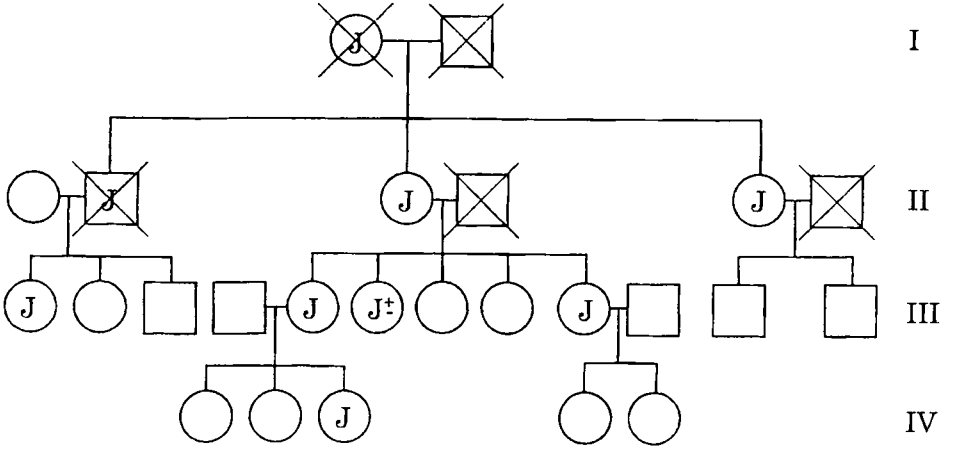

Fig. 1. Genealogical tree
– man, o – woman, × - dead person, J – patient with glaucoma

fore information pertaining to their medical condition was gathered on the basis of medical records available. The living members, from onset of disease and first diagnosis, till present day participate in scheduled periodic medical checks, which includes: vision acuity, perimetry, gonioscopy and evaluation of the optic disc. Three members were diagnosed with refractive errors (two members with myopia under –6 Dsph, and one member with over –10 Dsph).

RESULTS AND DISCUSSION

In members of the first two generations (three persons) POAG occurred in the later period of their life, past 50, and was related to markedly advanced glaucomatous neuropathy with a stable level of intraocular pressure. Members of the 3rd generation were diagnosed with POAG at a markedly earlier age, that being between the ages of 30–40, and in a member of the 4th generation the disease was diagnosed at the age of 23. At the moment of diagnosis, noticeable changes in the appearance of the optic nerve were marked, and cup/disc ratio ranged between 0.5 and 0.8, as well as noticeable differences in the vision field could be observed.

At present the treatment of glaucoma is largely based upon lowering intraocular pressure. Familial occurrence of glaucoma strongly suggests that genetic defects predisposing to this condition are likely, which are most probably a consequence of the existence of a multitude of genes responsible for the occurrence of this disease. In the future, when all genes have been mapped, traditional treatments could be replaced with gene therapy, in which the mutant gene would be replaced with a normal one (6).

CONCLUSIONS

1. A definitive description of the method of transmission of the defect in the above described family will require an additional genetic analysis on the basis of markers used for glaucoma diagnosis.

2. The occurrence of noticeable glaucomatous changes in optic disc in young persons, would suggest a higher susceptibility to damage of the optic nerve in hereditary glaucoma.

3. The study and testing of members of the family of patients with POAG should be carried out much earlier than at the presently recommended age (after the 40th year of life).

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SUMMARY

The occurrence of primary open glaucoma (POAG) in families proves the hypothesis that POAG is a disease with underlying genetic factors. This work describes a family of four generations, in which eight members suffered from POAG. In the 3rd and 4th generation members, the disease occurred at an early age (between the age of 20-40 years), i.e. at a much earlier age than it could be expected. Therefore, a need arises to keenly observe families in which POAG is present.

Rodzinne występowanie jaskry pierwotnej otwartego kąta

Rodzinne występowanie jaskry pierwotnego kąta potwierdza hipotezę, że jest to choroba o podłożu genetycznym. W niniejszej pracy opisano czteropokoleniową rodzinę, w której osiem osób cierpiało z powodu jaskry. W trzecim i czwartym pokoleniu tej rodziny objawy choroby wystąpiły w młodym wieku (między 20 a 40 rokiem życia) czyli znacznie wcześniej, niż można by było oczekiwać. Stąd wydaje się nam konieczna obserwacja okulistyczna członków rodzin, w których występuje jaskra.