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Age related macular degeneration and presence of posterior vitreous detachment

Typ zwyrodnienia plamki żółtej związanego z wiekiem a obecność odłączenia tylnego ciała szklanego

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Summary:

Purpose: To find correlation between presence of PVD and incidence of different forms of AMD.

Material and methods: 210 eyes of patients with AMD were examined. Fluorescein angiography determined type of AMD and ultrasound examination evaluated presence of PVD. Control group included 164 eyes of patients routinely admitted to the hospital for cataract surgery. Inclusion criterion was lack of AMD and retinal medical history.

Results: In the control group prevalence of PVD was higher in women than in men – respectively 50.5% and 23.6%. PVD was more frequent in male patients with dry AMD (50%) than in male controls (23.6%). PVD was also more frequent in female patients with dry form of AMD (69.2%) than in controls (50.5%). In female group with AMD PVD was more frequent in patients with dry form of AMD than in patients with wet form of AMD (69.2% and 44.8%). In patients with dry AMD, PVD was statistically more frequent in women (69.2%) than in men (50%). Statistically significant was the difference between prevalence of PVD in dry and wet group (male and females together) – 60.7% in dry AMD and 42.6% in wet AMD.

Conclusion: Persistence of vitreal adhesion and traction with age might lead to a shift of the dry form into wet form of AMD. Detachment of the vitreous in dry AMD might secure the persistence of dry form. Women, due to early PVD are more prone to complications resulting from vitreoretinal traction.

Słowa kluczowe:

zwyrodnienie plamki żółtej związane z wiekiem, odłączenie tylne ciała szklanego, angiografia fluoresceinowa.

Key words:

age related macular degeneration, posterior vitreous detachment, fluorescein angiography.

Introduction

The subject of relationship between posterior vitreous adhesion and development of age related macular degeneration is rarely discussed in literature. Authors try to find the correlation between the prolonged vitreoretinal traction and possible increasing risk of wet form of AMD (1) or generally state that early PVD might protect against development of any form of AMD (2,3). Our study seeks to find the correlation between type of AMD (dry or wet) and presence of posterior vitreous detachment. We believe that prolonged vitreoretinal traction might create suitable conditions for development of wet form of macular degeneration. In consequence, statistical confirmation of that kind of statement, might create new possibilities in treatment of AMD at early stage, before development of choroidal neovascularisation.

Material and methods

In our study we examined 210 eyes of patients with different forms of AMD, who were consecutively examined in our fluorescein angiography laboratory. Examination included fluorescein angiography by means of which type of AMD was determined, ultrasound examination used for evaluation of the

presence or absence of posterior vitreous detachment. AMD was divided into two major groups: wet and dry, according to common knowledge on the subject. Dry form included presence of drusen (hard, soft or both), RPE changes (hyperpigmentation and/ or depigmentation), drusenoid RPED, geographic atrophy of RPE. Wet form gathered cases with presence of CNV, serous RPED without CNV and disciform scar (4).

Ultrasound examination included presentation B test. Partial detachment of vitreous in posterior pole was considered as lack of detachment.

Control group included 164 eyes of patients routinely admitted to our hospital for cataract surgery. For the control group we qualified eyes with moderate cataract or healthy second eyes, when examination of the fundus was possible. Major inclusion criterion was lack of any form of AMD as well as lack of history of any inflammatory diseases, previous surgery etc., that could affect vitreal adhesion in posterior pole.

Statistical analysis was done separately for men and women. Due to relatively small groups of patients it was impossible to perform further division into age groups.

We used the test of significance for evaluation of the difference of two fractions. We assumed the “zero” hypothesis of

the identity of two fractions, than we calculated value U for this hypothesis from the formula: $U = f_1 - f_2 / \sqrt{p(1-p) (1/n_1 + 1/n_2)}$, where f_1 and f_2 are the fractions in the first and second trial, n_1 and n_2 are the numbers of trials, p is an average fraction. Value U was then compared with the critical value U_k in t-Students distribution for $v = \infty$ and $p = 0.05$. After that "zero" hypothesis was either accepted or rejected.

Results

The average age of the whole AMD group was 74.15 ± 9.02 years. Average age of men was 71.27 ± 8.14 and 76.33 ± 8.69 years in women. In the dry AMD group it was 73.1 ± 9.2 and in the wet AMD group 77.8 ± 5.9 years.

In the control group average age was 71.65 ± 8.7 years. Among women it was 72.89 ± 8.3 and among men 69.18 ± 9.1 .

In the control group prevalence of PVD was much higher in women than in men – respectively 50.5% and 23.6% (Tab. I). The difference is statistically significant for $p < 0.05$. This situation justifies separate analysis of prevalence of PVD in patients with AMD for women and men.

Gender/ Płeć	Number of patients/ Liczba pacjen- tów	Number of pa- tients with PVD/ Liczba pacjen- tów z PVD	% of patients with PVD/ % pacjentów z PVD
Women/ Kobiety	109	55	50.5
Men/ Mężczyźni	55	13	23.6
Total/ Suma	164	68	41.46

Tab. I. Prevalence of PVD in control group.

Tab. I. Częstość występowania PVD w grupie kontrolnej.

In male group with AMD, PVD was more frequent in patients with dry form (50 %) than in wet form (38.8%) (Tab. II), however difference was not significant statistically. Statistical significance was found while comparing male group with controls: PVD was more frequent in patients with dry form of AMD (50%) than in male controls (23.6%). Such relationship was not significant for patients with wet form of AMD.

Type of AMD/ Postać AMD	Number of patients/ Liczba pacjentów	Number of pa- tients with PVD/ Liczba pacjen- tów z PVD	% of patients with PVD/ % pacjentów z PVD
Dry/ Sucha	72	36	50
Wet/ Wysiękowa	18	7	38.8
Total/ Suma	90	43	47.8

Tab. II. Prevalence of PVD in male group.

Tab. II. Częstość występowania PVD u mężczyzn.

In female group with AMD PVD was statistically more frequent in patients with dry form of AMD than in patients with

wet form of AMD (69.2% and 44.8% respectively) (Tab. III). Similar to male group PVD was more frequent in patients with dry form of AMD (69.2%) than in controls (50.5%). Such relationship was not statistically true for patients with wet form of AMD.

Type of AMD/ Postać AMD	Number of patients/ Liczba pacjen- tów	Number of pa- tients with PVD/ Liczba pacjen- tów z PVD	% of patients with PVD/ % pacjentów z PVD
Dry/ Sucha	91	63	69.2
Wet/ Wysiękowa	29	13	44.8
Total/ Suma	120	76	63.3

Tab. III. Prevalence of PVD in female group.

Tab. III. Częstość występowania PVD u kobiet.

Type of AMD/ Postać AMD	Number of patients/ Liczba pacjentów	Number of patients with PVD/ Liczba pacjentów z PVD	% of patients with PVD/ % pacjentów z PVD	Average age/ Śred- ni wiek
1 + 2	95	53	55.8	72.12
3	42	25	59.5	76.16
4	26	20	76.9	77.09
5	47	20	42.6	79.65
Total/ Suma	210	119	56.7	76.23

Tab. IV. Prevalence of PVD in male + female group according to CARS classification.

1 – predominant hard drusen, 2 – mixed drusen soft and hard plus/or pigment abnormalities 3 – predominant soft drusen, 4 – geographic atrophy of RPE, 5 – any wet form of AMD including disciform scar.

Tab. IV. Częstość występowania PVD u kobiet i mężczyzn łącznie według klasyfikacji CARS.

1 – przewaga druz twardych, 2 – druzy mieszane twarde i miękkie i/ lub nieprawidłowości barwnikowe, 3 – przewaga druz miękkich, 4 – zanik geograficzny RPE, 5 – każda postać wysiękowa AMD, włączając bliznę tarczowatą.

Type of AMD/ Postać AMD	Number of patients/ Liczba pacjentów	Number of pa- tients with PVD/ Liczba pacjentów z PVD	% of patients with PVD/ % pacjentów z PVD
Dry/ Sucha = 1+2+3+4	163	99	60.7
Wet/ Wysiękowa = 5	47	20	42.6
Total/ Suma	210	119	56.7

Tab. V. Prevalence of PVD in male + female group together.

Tab. V. Częstość występowania PVD u kobiet i mężczyzn łącznie.

In the group of dry AMD PVD was statistically more frequent in women (69.2%) than in men (50%). Such relationship does not apply to wet form of AMD (no statistical difference between men and women).

Tables IV and V present distribution of PVD in subgroups of AMD according to CARS classification without including gender

division. Differences between them are not statistically significant for $p < 0.05$, but they demonstrate interesting tendency toward more prevalent PVD in advanced dry form of AMD (ex geographic atrophy) and less frequent for exudative form of AMD. Statistical significance was found while comparing all patients with dry form of AMD (men + women) with controls (60.7% and 41.46% respectively). No such relationship was true for all patients with exudative AMD. Statistically significant is also the difference between prevalence of PVD in dry and wet group (male + females together) – 60.7% in dry AMD and 42.6% in wet AMD.

Discussion

The subject of finding a link between adhesion of posterior vitreous and development of wet or dry form of AMD was occasionally discussed in the literature. Generally researchers analyzed relatively small groups of patients and did not consider gender or age as important factor (1-3). According to many published papers PVD is more frequent in women than in men as well as prevalence of PVD increases with age (5-7). Accepting such situation in analyzing patients with AMD we should keep in mind that probable relationship between PVD and development of different forms of AMD has to be affected by, let's call it, natural course of vitreal detachment, more frequent with increasing age and more frequent in women. In our study, groups of patients were too small to analyze them in age groups, but we managed to include gender. We found significant difference between prevalence of PVD in males and females in control group, which additionally to facts from literature, inclined us to analyze separately male and female group with AMD.

Looking at our results, we see that in both, male and female group dry form of AMD is associated with definitely higher percentage of PVD than in controls. On the contrary, there is no significant difference between prevalence of PVD in controls and in wet AMD group in both genders. We can assume, considering low percentage of patients with PVD and wet form of AMD, that lack of vitreous detachment and persisting vitreoretinal traction might create favourable conditions for development of wet form of AMD. On the other hand, early PVD might protect patients from evolution of early form of AMD towards wet form of AMD and persist dry.

Looking at controls we see, that detachment of vitreous is definitely more frequent in women. In other words, natural course of aging of vitreous in women is to proceed towards detachment of vitreal body. In consequence, this gender is more prone for complications resulting from vitreoretinal traction. Following this rationale, we might suggest, that lack of vitreal disturbances might generally protect against development of AMD. On the contrary, either prolonged traction, or early detachment of vitreous, can be a risk factor for development of one or another form of macular degeneration.

This general hypothesis might add to explanation of more frequent AMD in women, in whom tendency for PVD has been proven (8-10).

Scenario of vitreal detachment in AMD might be drawn on the basis of the tendency shown in table IV. Early (predominant hard drusen) or intermediate (increasing percentage of soft

drusen and pigment abnormalities) stage of dry AMD is associated with relatively low percentage of PVD. Persistence of vitreal adhesion and traction with age might lead to a shift of the dry form into wet form of AMD (older population). On the other hand, detachment of the vitreous in dry AMD, probably secures the dry form, which with age develops into geographical atrophy of the RPE.

What we consider important is analysis of the same subject in age groups – decades strating from 50 to 90 +. This way we could overlap the natural course of vitreal detachment with aging on its disturbances related to AMD. This is our next project in research on the subject.

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