CORRELATION BETWEEN BULBAR AXIS LENGTH AND RETINAL RUPTURES IN CASE OF MYOPIA EYE

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Abstract

In this study, we analysed 180 eyes with myopia in order to determine the "critical" length of bulbar axis for the occurrence of retinal ruptures as the main cause for retinal detachment.

After the focused ophthalmological assessment, ultrasonic measurement of the bulbar axis length, indirect binocular ophtalmoscopy, we analysed diagnosed retinal ruptures according to the shape and axis length.

Mean age of our patients was between 48,43 and to 51,60 years with SD ranging from 13,88 to 18,45. The study included 102 (56,6%) male and 78 (43,3%) female patients; there was no statistically significant difference regarding the occurrence of retinal ruptures between male and female patients compared to the axis length. Most dominant was round (28,2%), then oval (25%) category – multiple small ruptures (19,2%), and horseshoe-shaped (15,3%), and finally the ruptures with operculum.

We consider the length of bulbar axis ranging from 24,52 mm to 26,51 mm to be a predictive factor in the occurrence of retinal rupture, and later in retinal detachment.

KEY WORDS: myopia, "critical" length of bulbar axis, retinal rupture

Introduction

Every day ophthalmologists witness the occurrence of retinal detachment in people with myopia. The retinal detachment involves separation of the neurosensory retina from the pigmented retinal epithelium and it is one of the emergency states in ophthalmology. Many researches showed that in the pathogenesis of retinal detachment, an important role is played by peripheral retinal degenerations, retinal ruptures, viteroretinal tractions and detachment of vitreous cavity (1, 2). Also associated with myopia are 42% of retinal detachments (3). Prevalence of myopia-related refraction among adults is 20 % in the USA, in Western European countries 26,6%, UK 53,6%, and in Australia 77% (4, 5, 6). Early detection of the predisposing lesions and retinal ruptures and application of the adequate prophylactic measures have important role in prevention of retinal detachment (7). Retinal ruptures represent a break into retina continuity, which affects all layers except pigmented epithelia. Rupture existence was first noticed by Helmholtz, while Gonin pointed out the importance of its surgical closure in order to treat retinal detachment (8). In morphological sense, we distinguish horseshoe-shaped ruptures with operculum, round or oval, U-shaped ruptures, incomplete or layered erosions. Desinsertio s. dialysis retinae represent special shape of retinal ruptures when the retina is separated in the area of ora serata (9). The main goal of this research is to find the "critical length" of the bulbus in case of which we will find the largest number of retinal ruptures as a direct cause for the occurrence of retinal detachment.

Patients and Methods

The study is conducted as clinical, prospective, and controlled. We analysed 180 eyes of the patients with myopia. Study involved all the patients who have verified myopia of 0,25 dsph or more by the ophthalmology methods of examination, regardless of gender, profession and stage 0 diseases, and children over 7 years. From the study excluded were the patients with the acute ophthalmology diseases, and other diseases which cause less transparency in the optical mediums. After ophthalmology anamnesis which is analysed as personal with special review of clarity of sight and symptoms: "flying fly", "sparks" and occurrence of "curtain" within field of vision, we analysed family history in terms of positive anamnesis in closest relatives. Afterward we measure the length of the bulbar axis by the ultrasonic A scan method. We conducted examination of the chorioretinae in the indirect binocular biomicroscopy using Volk lens of 90 dsph and Goldmann contact prism. All noticed changes were noted on the Amsler-Dubois scheme, modified according to Schepens, which involves the area of ora serata, using Meyer-Schwickerath symbols. In the elements of vital statistics, we analysed samples according to gender and age. In case of parametric values, we used Student t test, and for the nonparametric data Chi-square test. All eyes were divided into three groups according to the length of bulbar axis:

1) from 22,01 to 24,51 mm
2) from 24,52 to 26,51 mm
3) from 26,52 to 32,99 mm

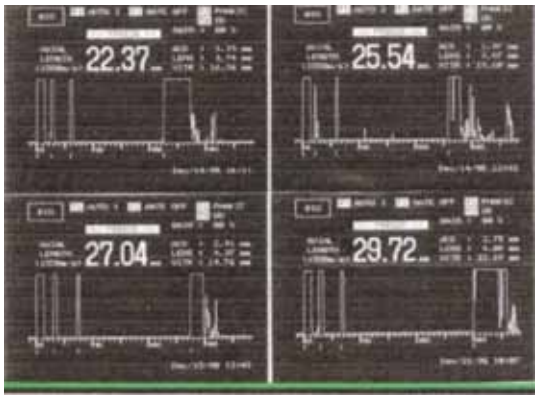

FIGURE 1. A scan echogram in different length axis bulbi

Results

Patient's age is placed in ration to the length of bulbar axis. Mean patients age ranging from 48,79 to 50,71 with SD mean ranging from 14,49 to 17,88 (Table 1).

	AXIS I	AXIS II	AXIS III
	I	II	III
N	79,00	48,00	53,00
X	50,23	48,79	50,71
SD	15,49	17,88	14,49

TABLE 1. Patients' age compared to the bulbar axis length

In case of all axis length, male patients were more present than female. There was no statistically significant difference regarding gender and bulbar axis length (Table 2).

	AXIS I		AXIS II		AXIS III	
	I		II		III	
	f	%	f	%	f	%
MALE	49	62,1	27	56,2	29	54,7
FEMALE	30	37,9	21	43,7	24	45,3

TABLE 2. Distribution of patients according to gender compared to axis

We analysed the retinal ruptures according to shape at location equator -ora serata compared to the length of bulbar axis. According to shape, we divide them into: round, oval, horseshoe-shaped, ruptures with operculum and category of several small ruptures (Table 3).

	AXIS I		AXIS II		AXIS III	
	I		II		III	
	f	%	f	%	f	%
NOT PRESENT	40	66,68	27	45,00	35	58,33
ROUND	9	15,00	8	13,33	5	8,33
OVAL	3	5,00	7	11,66	10	16,68
HORSESHOE	1	1,66	8	13,33	3	5,00
WITH OPERC.	1	1,66	4	6,66	4	6,66
SEVERALSMALL	6	10,00	6	10,00	3	5,00

TABLE 3. Distribution of peripheral ruptures according to axis

	AXIS I	AXIS II	AXIS III
AXIS I		p=0,0435	p=0,1072
AXIS II			p=0,3550

TABLE 4. Chi-square test α=0.05 (*fields in orange represent significance) related to Table 3.

Within the baseline of 180 tested eyes, we found 78 (43,3%) retinal ruptures, and without them among 102 (56,6%) tested eyes (Table 4).

Discussion

Retinal ruptures within eye of myopia patients are a huge threat of the occurrence of retinal detachment, which results in a decrease of sight and damage to other functions of sight. Ruptures can vary in shape and location. In case of diagnosed ruptures in one eye, it is recommended to test also the other "healthy eye". Bilateral ruptures are often combined with their symmetric localization. Ruptures can be located in various sectors and meridians of the fundus, including macula (10, 11). But the upper temporal quadrant is considered to be the most frequent location of ruptures in general, 67% according to Evertt and 55% according to Tulloh (12, 13). In this study, we analysed the occurrence of retinal rupture in case of various lengths of bulbar axis. Mean age of our patients varied from 48,43 to 51,60 with SD ranging from 13,88 to 18,45. After in-group analyses of retinal rupture numbers, we did not find any statistically significant difference related to patient's age (Table 1). This study covered 102 (56,6%) males and 78 (43,3%) females. Analysis between groups with Chi-square test did not find any statistically significant difference regarding the occurrence of retinal ruptures among male and female patients compared to the axis length (Table 2). In our patients, we found 78 (43,3%) retinal ruptures, located in the area of equator-ora serata in different quadrants, usually in the upper temporal. We analysed those retinal ruptures according to shape. The most frequent were round (28,2%), then oval (25%), category of multiple smaller ruptures (19,2%) and horseshoe-shaped (15,3%), and finally ruptures with operculum. From a total of 78 detected retinal ruptures, 33 (42,3%) were in the second group with the length of axis varying from 24,52 mm to 26,51 mm (Table 3). After the statistical analysis of groups with Chi-square test, we found statistical significance between the first and second groups with p=0,0435 for alpha = 0,05 (Table 4). Based on the data obtained, we can conclude that in the group with myopia and above the mentioned axis length, the frequency of ruptures is the highest, or we can consider this axis length as predictive for the occurrence of retinal detachment. Also, with this we proved the existence of positive correlation between the frequency of retinal ruptures and the bulbar axis length. Occurrence of retinal ruptures in myopia eye must be taken seriously. Patients' complaints are usually metamorphopsy, micropsy, glittering in front of the eye and opacities. In some cases ruptures are "silent"; they pass undetected, and are discovered during routine examinations. Retinal ruptures with edges without vitreoretinal tractions do not need to be preventively treated (16,17). But, in cases of myopia, aphakia, pseudoaphykia, in persons actively participating in sport, in patients with a positive family history or similar changes in the other eye, it is recommended to close the ruptures in order to prevent retinal detachment (18,19). The following methods can be applied: laser photocoagulation, retinopexis, scleral bucking, and injections of expanding gas into the vitreous cavity (20, 21, 22). After these interventions, complications can occur such as macular pucker from 0 to 2,2 %, degeneration of vitreous cavity from 2,1 to 6,7% and retina detachment from 1,8 to 6,2% of cases (18,19).

Conclusion

We consider the ength of bulbar axis ranging from 24,52 mm to 26,51 mm to be a predictive factor in the occurrence of retinal rupture, and later in retinal detachment.
In order to prevent retinal detachment in the eye with myopia, we suggest a detailed examination of the eye fundus in case of patients with the above mentioned length of bulbar axis. Diagnosed retinal ruptures can be adequately surgically treated as prophylaxis.

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