

# CLASSIFICATION OF VITREOUS OPACITIES AND THE RELATIONSHIP OF VITREOUS OPACITY IN CATARACT

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## Abstract

In the past, the transparency of the vitreous and associated problems of detailed clinical examination resulted in poorly defined concepts of vitreous pathology. With ultrasonography "traction", "contraction", "organisation", "opacity" of the vitreous is standardized nomenclature in respect of both nature and location, and surgical techniques have been applied as necessary. To our knowledge there is no classification of vitreous opacity in medical literature up to now. So we carry out this study on the vitreous opacity by ultrasonography as an evidence-based medicine and describe the relationship of vitreous opacity in two groups: cataract and no cataract contributing in treatment better.

## 1. Introduction

The vitreous is normally transparent, consists of collagen fibrils and hyaluronic acid molecules with the absence of blood vessels and cells. It is principally maintained by the blood-retinal barrier. Disturbances of intrinsic vitreous biochemistry are generally responsible for vitreous opacity.

In the past, the transparency of the vitreous and associated problems of detailed clinical examination resulted in poorly defined concepts of vitreous pathology. With ultrasonography "traction", "contraction", "organisation" of the vitreous is standardized nomenclature in respect of both nature and location, and surgical techniques have been applied as necessary [1,2,3]

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**Key words:** vitreous opacity, vitreous pathology, ultrasonography.

To our knowledge there is no classifications of vitreous opacity in medical literature up to now. In this paper we introduce a classification of vitreous opacity by ultrasonography contributing in evidence-based medicine and primarily investigate the prevalence of vitreous opacity (VO) on persons 50 years old and describe the relationship of vitreous opacity in two groups: cataract and no cataract.

## 2. Methodology

### Methods and Participants

1- A cross-sectional clinic-based study was carried in 1975 consecutive patients at eye clinic: 1108 men and 867 women who were examined by one ophthalmologist from Jan 1999 to April 2001.

2- A case-control study investigated the relationship between cataract group and non-cataract group, each group 200 patients. Trauma, uveitis were excluded in this study.

3- *Principal measurements:* The vitreous opacity was examined by ultrasound imaging system:

Alcon/version 2.02, probe 10 MHZ, speed 12HZ, high 3-6mm, caliper measuring accuracy 1mm or 3%. Six basic probe positions according to Cynthia J Kendall [2] as follows:

- (1). Horizontal transverse at 6 AM;
- (2). Vertical transverse at 9 AM;
- (3). Horizontal transverse at 12 PM;
- (4). Vertical transverse at 3 PM;
- (5). Vertical axial: over cornea and,
- (6). Horizontal axial at 4-5 hours. This scan will image the macula.

*Cataract examination* is done by direct ophthalmoscope Hein, indirect ophthalmoscope Scheepen [3].

#### 4. Classification of the vitreous opacity (Table 1)

Degree	Opacity	Vision	Ultrasound B	Ultrasound A
0	No	No change	$\leq 2\text{mm}$	No
I 1 <sup>st</sup> II 2 <sup>nd</sup>	Spot, spider, ring, fiber Small mass, traction( $\pm$ )	Can affect partially.	3X8mm	Positive+
III 3 <sup>rd</sup>	Big mass, contraction, traction.	Can decrease Totally	$\geq 8\text{X}8\text{mm}$	Positive++

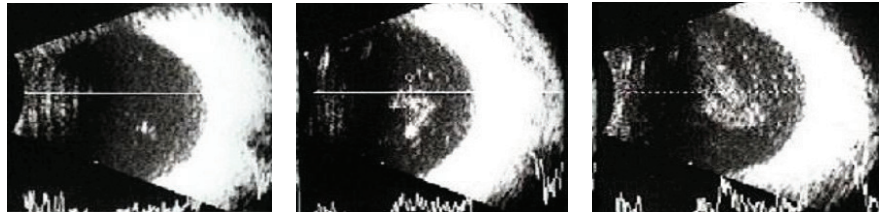
If both eyes had VO, eye with higher degree of VO was chosen.

#### 5. Differentiation in ultrasound features [2,3] (Table 2)

Ultrasound features	Posterior vitreous detachment	Retinal detachment	Choroidal detachment
Surface	Smooth,	Smooth, folded	Smooth, dome, flat
Funnel	Open,	Open, closed	At disc(-)
Insertion	At disc( $\pm$ ), Ora serrata(+) Ciliary body(+)	At disc(+), Ora serrata(+)	Ora serrata(+) Ciliary body(+)
Mobility after eye movement	Marked to moderate (+)	Moderate to none ( $\pm$ )	Mild to none ( $\pm$ )

### 3. Results

Mean age (years) was  $65.1 \pm 11.2$ ; range: 50-89.



The first degree

The second degree

The third degree

Table 3: Distribution of vitreous opacity according to sex: The prevalence of the vitreous opacity (VO) was  $80\% \pm 3.2\%$ , consisted of the 1st degree 60%, 2nd degree 15% and 3rd degree 5%. The percentage of VO on female was 82% (711/867 persons) and on male was 78.4% (869/1108 persons)

Degree	Male: number(percent)	Female: number(percent)	Total: number(percent)
I	626 (72)	519 (73)	1185(60)
II	174 (20)	142 (20)	296(15)
III	69 (8)	50 (7)	99 (5)
Total	869(100)	711(100)	1580(80)

Table 4: Distribution of vitreous opacity according to cataract and no cataract: In this case-control study the prevalence of VO on cataract group and no cataract group was 70% vs 66% (140/200 persons vs 132/200 persons) [4], whereas the prevalence of cataract was 44.9% (887/1975 persons) higher than a population -based study 33% in 1998.[5]

	Cataract (Number)	No cataract (Number)
Vitreous opacity	140	132
No vitreous opacity	60	68
Total	200	200

OR=1.2, CI 95%=0.7-1.8; p=0.39.

Table 5: The percentage of vitreous opacity according to cataract and no cataract: The percentage of 3rd degree in cataract and no cataract was 10% vs 9%

Degree	Cataract: Number(percent)	No cataract: Number(percent)
I	91(65)	90(68)
II	35(25)	30(23)
III	14(10)	12 (9)
Total	140(100)	132(100)

Table 6: The vitreous opacity according to operated cataract and unoperated cataract: The OR is 2,1, p=0,04 of vitreous opacity between 2 groups : operated cataract and unoperated cataract.

	Operated cataract (Number)	Unoperated cataract (Number)
Vitreous opacity	51	39
No vitreous opacity	20	32
Total	71	71

OR=2.1, CI 95%=0.9-4.4; p=0.04

## 4. Discussion and Conclusion

There are many causes of the vitreous opacity. Asteroid hyalosis occurs in otherwise healthy eyes in elderly people. The opacities have little or no effect upon vision and are no clinical significance. Synchrony scintillans is white cholesterol crystals, has its onset before age 40 but no relationship has been established with elevated blood cholesterol. Asteroid hyalosis and calcium have a strong echoes. Weaker echoes are noted from clotted vitreous cell. Amyloidosis is a prealbumin, can be affect partially vision according to size as well as position. Vitreous hemorrhage is an uncommon but serious disorder. It is usually due to traumatic rupture of a retinal vessel that caused posterior vitreous detachment (7-12%), retinal detachment (7-17%), neovascular post occlusion of the retinal vein (3-10%), but may related to diabetes mellitus (39-54%), hypertension,

perivasculitis, Eal's disease Ultrasound can assess for the presence of a tractional retinal detachment involving the fovea when visualization is occurred by vitreous hemorrhage [6].

In this study we do not investigate the causes of VO. Up to now there is no classification of vitreous opacity in medical literature. We introduce a classification of vitreous opacity as mentioned above. We primarily study on the prevalence of VO on persons 50 years old and over. The prevalence of VO on 50 years old and over was  $80\% \pm 3.2\%$ . This study was performed on the consecutive patients for ophthalmic problems, was not a population-based study but this prevalence is primarily put a problem for ophthalmologists. According to John A Fielding with asteroid hyalosis, this is a senile degenerative disorders of an unknown origin occurring uni eye in 75% of cases [7].

The disadvantages of our classification of VO are vitreous mobility, polymorphism, different nature, and therefore the precise of measurement is relatively. Our results showed 2nd and 3rd degree that can affected vision occupied 20%.

We considered VO as a sign of case-control study compared the relationship between cataract and no cataract patients. All the cases of trauma and uveitis are excluded in this study. In our case-control study we assessed the vitreous opacity between cataract and no cataract by the odds ratio : 1.2, 95% confidence interval 0.7 to 1.8,  $p=0.39$ . (TABLE 4) Vitreous physically buffers in the internal ocular organs from shock and trauma. It also acts as a nutrient and waste products reservoir for the surrounding tissues. Glucose is taken up the metabolic in retina and lens, sodium and potassium are exchanged at the lens posterior surface, magnesium is secreted into the vitreous from the retina, lactate and pyruvate diffused from the retina into posterior vitreous. Both ageing and metabolic diseases can affect the vitreous body, the collagen network tends to collapse forming small lakes of fluid in the matrix. Diabetes may change the collagen as well as amino sugar of the vitreous caused vitreal contraction and detachment [8].

The percentage of 3rd degree in cataract and no cataract was 10% vs 9% (TABLE 5). The artifact may be excluded vitreous opacity [9]. Vitreous opacities can be classified according to their aetiology [10].

The odds ratio of the VO between operated cataract and unoperated cataract was 2.1, ninety-five percent of confidence interval was 0.9 to 4.4 ,  $p=0.04$ . (TABLE 6). The ocular disorders after lens extraction may be increased the risks for VO. Therefore, a further prospective study on pre and post lens extraction should be done for identifying.

### Conclusion

1. With this classification, the prevalence of vitreous opacity on elderly persons is  $80\% \pm 3.2\%$ , further study should be done for risk factors in order to prevent as well as treat as soon as possible.

2. The relationship of vitreous opacity between unoperated cataract and operated cataract is different in statistics ( $p=0.04$ ) and a prospective study

should be done for identifying. The ultrasonography is cost benefit, effective, unharmed for patients, should be done for preoperative cataract patients in mobile cataract surgery camps [5] (high volume) for screening preoperation as well as in prognosis vision post operation.

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