

## VISUAL ACUITY AND ACUTE ANGLE-CLOSURE GLAUCOMA IN SPLIT-DALMATIA COUNTY

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**SUMMARY** – The aim of this study was to determine the incidence of acute angle-closure glaucoma in Split-Dalmatia County and correlation between visual acuity and time (days) elapsed from the disease onset to hospital admission. Twenty-nine cases were retrospectively analyzed. There were 19 female patients aged 36-91 (median age 68) years and 10 male patients aged 35-88 (median age 70) years, with attacks of acute closure glaucoma treated at University Department of Ophthalmology, Split University Hospital Center from January 2002 until December 2005. Annual incidence was 1.6 cases *per* 100,000. The time elapsed from the disease onset to hospital admission was 1-21 (median 2) days. Visual acuity before and after treatment was reversely proportional to the number of days to hospital admission ( $d=-0.466$ ;  $p=0.011$ ). Visual acuity was found to depend on age as well ( $z=1.999$ ;  $p=0.044$ ). The best visual acuity was obtained in those cases that were admitted within two days ( $z=2.014$ ;  $p=0.044$ ). There was no significant sex difference in the incidence of angle-closure glaucoma ( $t=0.389$ ;  $p=0.699$ ). No statistically significant association was found between acute angle-closure glaucoma and seasonal variation ( $\chi^2=5$ ;  $p=0.167$ ). In conclusion, earlier recognition of the symptoms of acute angle-closure glaucoma and initiation of treatment within two days of the disease onset were associated with better visual acuity.

**Key words:** *Glaucoma, angle closure – epidemiology; Glaucoma, angle closure – etiology; Acute disease; Incidence; Age distribution*

### Introduction

Angle-closure glaucoma is a form of glaucoma where the anterior chamber tends to be smaller than average<sup>1</sup>. There is a relative block to the passage of aqueous from the posterior to the anterior chamber because of the contact of the iris with the lens around the pupil<sup>1</sup>. Patients with characteristic gonioscopic criteria (non-visibility of the filtering trabecular meshwork by 180 degrees or more) and intraocular pressure higher than 21 mm Hg in the absence of optic disk damage, visual field changes and peripheral anterior synechiae are classified in the group of acute angle closure attacks<sup>2</sup>. Patients with acute angle closure attacks along with optic disk dam-

ages and visual field changes are classified as acute angle-closure glaucoma.

The median time from the onset of symptoms to presentation to the hospital is the main factor determining therapeutic outcome in acute angle-closure glaucoma. Therapeutic approach tends to compensate for the process, i.e. to maintain eye function at the existing damage level<sup>3</sup>.

The aim of this study was to determine the incidence of acute angle-closure glaucoma in the Split-Dalmatia County and correlation between visual acuity and number of days from the disease onset to initiation of treatment.

### Patients and Methods

Medical documentation of 29 patients (19 female and 10 male) with acute angle closure attacks, treated at University Department of Ophthalmology, Split Uni-

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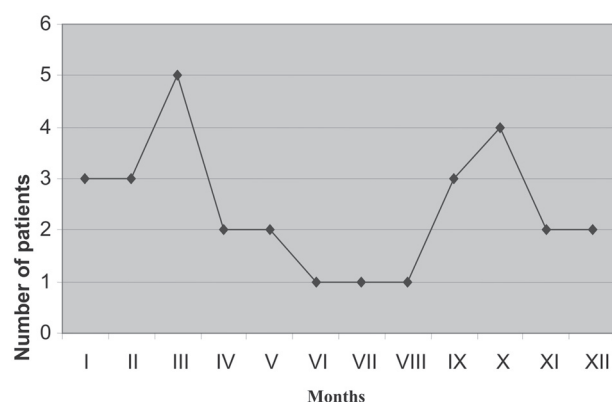


Fig. 1. Number of cases of acute angle-closure glaucoma according to months.

versity Hospital Center from January 2002 until December 2005, was retrospectively analyzed. There were 19 (65.5%) female patients aged 36-91 (median age 68) years and 10 (34.5%) male patients aged 35-88 (median age 70) years. In each patient, the diagnosis was confirmed by reviewing hospital records.

In this study, the attack of acute angle closure was defined as sudden pain around the eye, intraocular pressure higher than 21 mm Hg and gonioscopic confirmation of the closed eye angle (non-visibility of the filtering trabecular meshwork by 180 degrees or more). Depending on optic nerve head and visual field changes, the patients were divided into two groups: acute angle closure without disk damage and visual field changes; and acute angle-closure glaucoma including optic disk damage and visual field changes. Patients with secondary glaucoma were excluded from the study.

Medical treatment for acute angle-closure glaucoma consisted of intravenous mannitol, acetazolamide tablets 250 mg two times daily, topical pilocarpine 2% four times daily, and timolol 0.5% two times daily, followed by peripheral iridectomy.

Table 1. Seasonal variation and incidence of acute angle-closure glaucoma

Season	Patients		Incidence*
	n	%	
Autumn	9	31.0	0.5
Winter	9	31.0	0.5
Spring	9	31.0	0.5
Summer	2	7.0	0.1
Total	29	100.0	1.6

\*Values are expressed as incidence *per* 100,000 population *per* year

Table 2. Pretherapeutic visual acuity

Visual acuity	n	%
Amaurosis	1	3.4
Light perception	3	10.3
Hand moving	6	20.7
Counting fingers at 1 m	3	10.3
0.02-0.08	6	20.7
0.10	6	20.7
0.20	1	3.4
0.50	3	10.3
Total	29	100.0

The population data for the Split-Dalmatia County were based on the 2001 census when total population was 436,676<sup>7</sup>. Statistical analysis was done using the  $\chi^2$ -test, Mann-Whitney test, Kruskal-Wallis test and descriptive statistics. The Statistica for Windows software (StatSoft Inc., Tulsa, OK, USA) was used on data analysis.

## Results

The incidence of acute angle-closure glaucoma in our study was 1.6 *per* 100,000 *per* year. The incidence of acute angle-closure glaucoma and seasonal variation are presented in Table 1. The number of patients with acute angle-closure glaucoma according to months is shown in Fig. 1. The median time elapsed from the onset of symptoms to presentation to the hospital was two days (range 1-21 days). Visual acuity before and after treatment was reversely proportional to the number of days elapsed to hospital admission ( $\delta=-0.466$ ;  $p=0.011$ ). Visual acuity

Table 3. Post-therapeutic visual acuity

Visual acuity	n	%
Amaurosis	1	3.4
Light perception	3	10.3
Hand moving	1	3.4
Finger counting at 1 m	2	6.9
0.10	1	3.4
0.20	7	24.1
0.30	8	27.6
0.40	1	3.4
0.50	2	6.9
0.6>	3	10.3
Total	29	100.0

before and after treatment is presented in Tables 2 and 3, respectively. Visual acuity before and after treatment was associated with earlier hospital admission ( $z=2.014$ ;  $p=0.044$ ) and depended on patient age ( $z=1.999$ ;  $p=0.044$ ). There was no significant sex difference in the incidence of acute angle-closure glaucoma ( $t=0.389$ ;  $p=0.699$ ). There was no statistically significant association between acute angle-closure glaucoma and seasonal variation ( $\chi^2=5$ ;  $p=0.167$ ).

Twenty-four of 29 patients (82.8%) underwent surgery, while 5 (17.2%) patients were treated with conservative therapy. Basal iridectomy was done in 12, trabeculectomy in 8 and laser iridotomy in 4 cases.

## Discussion

From a public health perspective, the results of the present study may prove useful to predict the number of patients with acute angle-closure glaucoma that may be expected annually in the population of Croatia. In our study, the incidence of acute angle closure was lower than in other similar studies<sup>8-10</sup>. In the study by Ivanišević *et al.*<sup>9</sup> covering the 1995-1999 period, the incidence of acute angle-closure glaucoma was 4.1 cases *per* 100,000 *per* year in the Split-Dalmatia County, while in the study by Bojić *et al.*<sup>10</sup> it was 3.1 *per* 100,000 *per* year for the same period and region. Obviously, the incidence of acute angle-closure has decreased.

It is difficult to prevent attacks of acute angle-closure glaucoma; however, a shorter delay after the onset of symptoms (less than 2 days) could have prevented poor visual outcomes found in this study. The median time from the onset of symptoms to presentation to the hospital was two days, which is consistent with the study by Bojić *et al.*<sup>10</sup>, but is shorter as compared with the study by Seah *et al.*, where it was 3 days<sup>11</sup>.

Laser iridotomy or peripheral iridectomy is the preferred definitive treatment of acute angle-closure glaucoma. Filtering surgery is recommended if the attack of acute angle-closure glaucoma has lasted longer than 48 h and peripheral anterior synechiae have covered more than 75% of the trabecular meshwork<sup>4</sup>. Nowadays, primary trabeculectomy is not recommendable as first-line treatment<sup>5,6,8</sup>.

Visual acuity before and after treatment was associated with earlier hospital admission and depended on age. Unsatisfactory visual results despite apparently good intraocular pressure response were found in patients with delay in presentation for more than two days. The best visual acuity was obtained in those cases that were

admitted within few hours of symptom onset.

There was no significant sex difference in the incidence of acute angle-closure glaucoma. No statistically significant association was found in our or other similar studies between acute angle-closure glaucoma and seasonal variation<sup>8-10</sup>.

In conclusion, better recognition of the angle-closure glaucoma attacks by general practitioners and timely treatment could prevent visual impairment. The public should be educated about the necessity of seeking medical treatment early if eye symptoms such as sudden blurring of vision occur. Earlier recognition of the symptoms of acute angle-closure glaucoma and treatment initiation within two days are associated with better visual acuity.

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## Sažetak

## OŠTRINA VIDA I GLAUKOM ZATVORENOG KUTA U SPLITSKO-DALMATINSKOJ ŽUPANIJI

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Cilj ove studije bio je odrediti incidenciju akutnih napada glaukoma zatvorenog kuta u Splitsko-dalmatinskoj županiji te ispitati odnos između oštine vida i broja dana od početka bolesti do hospitalizacije. Ova studija je provedena retrospektivno na 29 slučajeva. Bilo je ukupno 19 žena u dobi od 36 do 91 godine (medijan 68 godina) i 10 muškaraca u dobi od 35 do 88 godina (medijan 70 godina) s akutnim napadima glaukoma zatvorenog kuta liječenih na Očnoj klinici Kliničkog bolničkog centra Split od siječnja 2002. do prosinca 2005. godine. Godišnja incidencija iznosila je 1,6 slučajeva na 100.000. Vrijeme od početka bolesti do javljanja u bolnicu iznosilo je od 1 do 21 dana (medijan 2 dana). Oštrina vida prije i poslije operacije bila je obrnuto proporcionalna broju dana do prijma u bolnicu ( $d=-0,466$ ;  $p=0,011$ ). Oštrina vida nakon liječenja ovisila je o ranijem javljanju u bolnicu te o ranije započetom liječenju. Za krajnji ishod oštine vida je uz ranije javljanje na liječenje bila važna i dob ( $z=1,999$ ;  $p=0,044$ ). Najbolju oštrinu vida nakon liječenja imali su oni bolesnici koji su hospitalizirani u prva dva dana ( $z=2,014$ ;  $p=0,044$ ). Nije bilo statistički značajne razlike u obolijevanju po dobi između žena i muškaraca ( $t=0,389$ ,  $p=0,699$ ), kao ni po godišnjem dobu ( $\chi^2=5$ ;  $p=0,167$ ). U zaključku, ranije prepoznavanje simptoma i liječenje akutnog glaukoma zatvorenog kuta započeto u prva dva dana bilo je povezano s boljom vidnom oštrinom.

Ključne riječi: *Glaukom, zatvorenog kuta – epidemiologija; Glaukom, zatvorenog kuta – etiologija; Akutna bolest; Incidencija; Dobna raspodjela*