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# INCIDENCE OF ACUTE ANGLE-CLOSURE ATTACKS IN SPLIT-DALMATIA COUNTY, CROATIA

Lovro Bojić[1], Veljko Rogošić[1], Željko Kovačić[1], Zlatko Kljajić[2], Nikola Kolja Poljak[2] and Zlatko Hrgović[3]

[1]University Department of Ophthalmology, [2]University Department of ENT, Split University Hospital Center, Split, Croatia; [3]Goethe University, Frankfurt, Germany

SUMMARY – The aim of the study was to determine the incidence of acute angle-closure attacks among residents of the Split-Dalmatia County, Croatia, during a 6-year period. In this retrospective, interventional case series study, hospital records of 53 consecutive patients (33 female, mean age 71.7±16.6 and 20 male, mean age 66.2±23.2) with acute angle-closure attacks, treated at University Department of Ophthalmology, Split University Hospital Center, Split, Croatia, from January 2002 to December 2007 were reviewed. The annual incidence of acute angle-closure attacks was 2 cases *per* 100,000 (95% CI, 0-3.4). The incidence of acute angle-closure was 0.6 (95% CI, 0-1.4) cases/100,000 *per* year. The incidence of acute angle-closure glaucoma was 1.5 (95% CI, 0-2.8) cases/100,000 *per* year. The incidence was 1.5 (95% CI, 0-3.4) cases/100,000 *per* year in males and 2.3 (95% CI, 0-4.6) in females. Nine (17%) patients were treated by medicamentous therapy, peripheral iridectomy was performed in 19 (36%) patients and laser iridotomy in 16 (30%) patients, whereas nine (17%) patients underwent filtering surgery. Median time between the onset of symptoms to presentation at the hospital was two days (range 1-21 days). There was no statistically significant association between the acute angle-closure attacks and seasonal variation ($\chi^2$-test=4.6; p=0.20). In conclusion, the number of patients with acute angle-closure attacks in the Split-Dalmatia County is relatively small; however, the significant incidence of acute angle-closure glaucoma could pose a social and health care problem in the County.

Key words: *Split-Dalmatia County; Glaucoma, acute angle-closure; Incidence*

## Introduction

Primary angle closure (PAC) is a condition of a rapid rise of intraocular pressure (IOP) because of pupillary block and obstruction of drainage angle of the anterior chamber including loss of vision and pain in the periocular region[1-4]. PAC is defined as an occludable drainage angle by peripheral iris, raised IOP, and other signs indicating trabecular obstruction (peripheral anterior synechiae, lenticular opacities and loss of iris color), but without glaucomatous optic neuropathy (GON)[2,3]. Occludable angle is defined as a posterior trabecular meshwork unseen in greater than or equal to 270 degrees[2]. According to the mode of clinical presentation, the term of acute angle-closure (AAC) is used in case of circumferential iris apposition to the trabecular meshwork with rapid rise of IOP[3]. Acute angle closure glaucoma (AACG) is defined as AAC with GON[3]. Medical treatment only serves to lower IOP and relieve symptoms, so that laser iridotomy or iridectomy is possible[4]. Trabeculectomy is not recommended as first line treatment in AAC and AACG[4,5].

In a previous study of the incidence and treatment of AACG in Dalmatia, south Croatia during the pe-

Correspondence to: *Lovro Bojić, MD, PhD*, University Department of Ophthalmology, Split University Hospital Center, Spinčićeva 1, HR-21000 Split, Croatia
E-mail: lovreb@kbsplit.hr

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riod from January 1995 to December 2001, the incidence of AACG was (2.9/100,000), but the share of filtering surgeries was very high, without performing laser iridotomy[6]. Considering the incidence and treatment of AACG and not clearly defined AAC in the previous analysis, the aim of this study was to continue assessment of the incidence and treatment of AAC attacks in the Split-Dalmatia County, Croatia, in the period from January 2002 to December 2007.

## Materials and Methods

We retrospectively analyzed hospital records of 53 patients aged 45 to 88 (median 72) years, who presented with AAC attacks and were treated at University Department of Ophthalmology, Split University Hospital Center from January 2002 to December 2007. There were 33 women aged 48-88 (median 73) years and 20 men aged 45-84 (median 71.5) years. In each case, the diagnosis was confirmed by hospital chart review and cases were recorded according to the date of symptom onset rather than the date of admission to the hospital.

In this study, AAC was defined as severe and sudden symptoms of occluded angle (pain, headache, blurred vision, halos, nausea, vomiting) with peripheral iris and intraocular pressure over 30 mm Hg without GON[2,3]. AACG was defined as AAC with the presence of GON determined by visual field testing (automated static perimetry) and evaluating optic disk[2,3]. Gonioscopy of the fellow eye confirmed the presence of narrow angle defined as non-visibility of the filtering trabecular meshwork for 180 degrees or more, no peripheral anterior synechiae in the angle, and IOP <21 mm Hg. Patients with secondary angle-closure, such as neovascular glaucoma, lens-induced glaucoma, plateau iris, congenital glaucoma and uveitis were excluded from the study.

The initial medical treatment for AAC attacks was similar in all patients. It 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 laser iridotomy or peripheral iridectomy. Laser iridotomy or peripheral iridectomy is the preferred definitive treatment of AACG[4]. Filtering surgery (trabeculectomy) was done in case of AAC lasting for more than 48 hours, peripheral anterior synechiae covering more than two quadrants of trabecular meshwork, inefficient laser iridotomy or iridectomy, and presence of GON.

The population data for the Split-Dalmatia County were derived from the 2001 census when the total County population was 463,676[7]. Patients with AAC attacks living outside the Split-Dalmatia County were not included. Statistical analysis was performed using $\chi^2$-test and descriptive statistics. Confidence intervals (CI) for the incidence risk were calculated at the level of 95%[8]. Statistical package used on data analysis was Statistica for Windows 6.0 (StatSoft. Inc., Tulsa, OK, USA).

## Results

The incidence of AAC was 0.6 (95% CI, 0-1.4) cases/100,000 *per* year and the incidence of AACG 1.5 (95% CI, 0-2.8) cases/100,000 *per* year. The over-

*Table 1. Age and sex specific incidence of acute angle-closure attacks*

| Age group (yrs) | Patients with acute angle-closure attacks | | | | | |
|---|---|---|---|---|---|---|
| | Men | | Women | | Total | |
| | n | Incidence (95% CI**) | n | Incidence (95% CI**) | n | Incidence (95% CI**) |
| 45-54 | 4 | 2 (0-8) | 1 | 0.5 (0-3.3) | 5 | 1.2 (0-4.5) |
| 55-64 | 3 | 2.3 (0-9.7) | 4 | 3 (0-10.7) | 7 | 2.5 (0-8) |
| 65-74 | 8 | 7 (0-21) | 15 | 10.6 (0-26) | 23 | 9 (0-19.6) |
| >75 | 5 | 10.8 (0-38.4) | 13 | 13.7 (0-35.5) | 18 | 12.8 (0-30) |

*Values are given as incidence *per* 100,000 persons *per* year;
**confidence interval

all incidence of AAC attacks was 2 *per* 100,000 (95% CI, 0.3-3.4). The number of patients and the incidence according to age and sex are shown in Table 1. Out of 53 patients with AAC attacks, 38 patients had AACG and 15 had AAC. The peak incidence in both sexes was observed in the ≥60 age group, accounting for 81% of all cases. In the 45-54 age group, the relative risk of this disease was 4 (95% CI, 0.45-36) times higher for male population compared with females. In the 55-64 age group, the relative risk was 1.2 (95% CI, 0.3-5.5) times higher for female population compared with males, and in the 65-74 age group the relative risk was 1.5 (95% CI, 0.65-3.6) times higher for females. In patients over 75 years of age, the relative risk was 1.3 (95% CI, 0.45-3.6) times higher for females compared with males.

In our study, there was no significant seasonal variation of ACC attacks either in women ($\chi^2$-test=5.4; p=0.15), in men ($\chi^2$-test=6.8; p=0.08) or both ($\chi^2$-test=4.6; p=0.20). Nine (17%) patients were treated solely by medicamentous therapy during hospital stay. Laser iridotomy was performed later on outpatient basis. Peripheral iridectomy was performed in 19 (36%) and laser iridotomy in 16 (30%) patients. The patients undergoing iridotomy or iridectomy also received medicamentous therapy. Only nine (17%) patients underwent filtering surgery (trabeculectomy). Median time from symptom onset to treatment was 2 (range 1-21) days.

## Discussion

The overall incidence of AAC attacks in the Split-Dalmatia County was 2 cases/100,000 *per* year. In our study, the incidence of AACG was considerably lower than the AACG incidence reported from previous studies[6,9-11]. The incidence of AAC attacks in the Split-Dalmatia County cannot be strictly compared with previous studies because AAC patients were not clearly defined and classified in the latter[6,9-11]. Although the present study revealed a low incidence of patients with AACG, a significant number of these patients may pose a social and health care problem in our County.

Argon laser peripheral iridoplasty has been shown to be more effective than conventional systemic medications in reducing IOP in acute primary angle closure and can potentially help reduce subsequent progression to chronic angle closure glaucoma[3,4,12-14].

In the Split-Dalmatia County, there is only one hospital that might provide care to patients with AAC. The relatively low annual rate of AAC could be possibly explained by treating a significant number of patients in other hospitals and facilities outside the Split-Dalmatia County. It is also possible that some cases were not recognized as AAC.

In the present study, the relative risk of AAC attacks was 1.6 times higher for women than for men, but significantly lower compared to other studies[15,16]. In a previous study, the relative risk of AACG was 2-4 times higher for women than for men[6]. Interestingly, in the 45-54 age group, the relative risk was 4 times higher for men. The relative risk of AACG was highest in the elderly population (>60 years). A similar age-related increase in the incidence has been reported in Finland and Singapore[15,16]. The observation that the prevalence of gonioscopically occludable angles increases with age seems to explain this finding[17,18].

The initial treatment for primary AAC aims at rapidly reducing IOP so as to relieve excruciating symptoms and prevent further ocular damage. In our previous research, the best visual acuity was obtained in patients admitted to hospital within two days[11]. The median time from the onset of symptoms of AAC attacks to therapy initiation was two days, which was shorter in comparison to the study by Seah *et al.*, where it was three days[16].

There was no significant seasonal variation of AAC attacks, which is consistent with our previous studies but different from the study conducted in Finland[6,9-11,14].

In conclusion, the number of patients with AAC attacks among residents of the Split-Dalmatia County is relatively small, however, the significant incidence of AACG could pose a social and health care problem in the County.

Our study suffered some limitations: although the annual incidence reports solely patients presenting to only one hospital, thus making these patients represent the entire population, the low numbers could reflect the proportion of patients having been treated at other facilities.

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Sažetak

## INCIDENCIJA AKUTNIH NAPADAJA ZATVARANJA SOBIČNOG KUTA OKA U SPLITSKO-DALMATINSKOJ ŽUPANIJI, HRVATSKA

*L. Bojić, V. Rogošić, Ž. Kovačić, Z. Kljajić, N. K. Poljak* i *Z. Hrgović*

Cilj rada bio je ispitati incidenciju akutnih napadaja zatvaranja sobičnog kuta oka tijekom šest godina kod stanovništva Splitsko-dalmatinske županije. Provedena je retrospektivna, intervencijska analiza. Analizirani su podaci iz povijesti bolesti 53 bolesnika s kliničkom slikom akutnog zatvaranja sobičnog kuta oka (33 žene srednje dobi 71.7±16.6 godina i 20 muškaraca srednje dobi 66.22±3.2 godine) liječenih na Klinici za očne bolesti u Splitu u razdoblju od siječnja 2002. do prosinca 2007. godine. Ukupna godišnja incidencija svih akutnih napadaja zatvaranja sobičnog kuta oka iznosila je 2 na 100.000 stanovnika (95% CI, 0-3,4). Incidencija samog akutnog zatvaranja sobičnog kuta oka bila je 0,6 (95% CI, 0-1,4), dok je incidencija akutnog napadaja glaukoma zatvorenog kuta bila 1,5 (95% CI, 0-2,8) na 100.000 stanovnika na godinu. Incidencija kod muškaraca bila je 1,5 (95% CI, 0-3,4), a kod žena 2,3 (95% CI, 0-3,4) na 100.000 stanovnika na godinu. Devetoro (17%) bolesnika je liječeno isključivo lokalnom ili općom terapijom. Kod 19 (36%) bolesnika je napravljena periferna iridektomija, a laserska iridotomija kod 16 (30%) bolesnika. Kod 9 (17%) bolesnika izvedena je filtracijska operacija (trabekulektomija). Medijan vremena od nastupa prvih znakova bolesti do javljanja u bolnicu bio je 2 dana (raspon 1-21 dan). Nije ustanovljena statistički značajna povezanost akutnih napadaja zatvaranja sobičnog kuta i godišnjeg doba ($\chi^2$-test=4,6; p=0,20). U zaključku, broj bolesnika s akutnim napadajima zatvaranja sobičnog kuta oka u Splitsko-dalmatinskoj županiji je relativno nizak, međutim, značajna incidencija akutnog glaukoma zatvorenog kuta može činiti zdravstveni i socijalni problem u ovoj županiji.

Ključne riječi: *Splitsko-dalmatinska županija; Akutno zatvaranje sobičnog kuta oka; Glaukom; Incidencija*