



SHORT COMMUNICATION / КРАТКО САОПШТЕЊЕ

Stage of glaucoma damage before surgery

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SUMMARY

Introduction/Objective The aim of study was to collect information about factors related to glaucoma damage at the time of surgery in Novi Sad, Vojvodina province, Serbia.

Methods Retrospective data collection on filtering procedures of 38 patients with open-angle glaucoma was performed. The study was done at the University Eye Clinic, Clinical center of Vojvodina, Serbia between July 2011 and December 2014. The following variables were collected from a data collection sheet at last visit for each patient: age, sex, best-corrected visual acuity (BCVA), visual field indices (MD and PSD), number of active antiglaucoma drugs, glaucoma type, and surgical procedures.

Results The mean age was 66.21 ± 17.92 years. Among patients, 57% were female and 43% were male. Primary open angle glaucoma (POAG) was found in 60% (23/38), pseudoexfoliative glaucoma (XFG) in 37% (14/38) of patients. The median number of active antiglaucoma drugs was 2.73, ranging 1–4. More than 90% of patients were on two or more medications before surgery. Mean BCVA was 0.64 ± 0.68 and oscillated 0.1–1 (according to Snellen). IOP on last visit before surgery varied 15–42 mmHg (mean IOP 26.11 ± 13.20 mmHg). Visual field index MD showed minor and highest absolute values from -0.82 – -35.25 dB (mean MD -18 dB ± 19.15). All patients had trabeculectomy with Mitomycin C procedures.

Conclusion Our survey found that the level of damage is advanced in terms of visual field loss. In most patients (52.63%), visual acuity was well preserved. POAG and XFG are the most frequent diagnosis. Women and elderly population were represented in higher number in our study. Level of IOP suggests a trend to make a surgical decision at higher pressure regardless the stage of glaucoma damage.

Keywords: glaucoma; stage; damage; surgery

INTRODUCTION

Glaucoma is the leading cause of irreversible blindness in Europe. There are many risk factors for glaucomatous optic neuropathy, but the two most consistent of which appear to be intraocular pressure (IOP) and age [1]. Controlling IOP has been the primary focus of glaucoma treatment. Increasing age was associated with increasing IOP in most studies [1]. Direct correlation between extent of visual field loss and the level of pre-treatment IOP have been found to be weak for primary open angle glaucoma (POAG) [2, 3]. The probability of developing glaucoma at certain IOP may be different for different types of glaucoma [4]. Stronger correlation between visual field loss and IOP has been seen in pseudoexfoliative glaucoma (XFG) [2].

Major risk factors for glaucoma blindness are the severity of the disease at presentation and life expectancy [5]. A young patient with mild optic nerve damage is at much higher risk of getting blind in his lifetime than older patients, so the treatment must be individualized to the needs of rate of progression. Patients with severe functional loss or younger patients with manifest disease should have more aggressive treatment, including filtration surgery [6, 7].

The goal of glaucoma therapy is to maintain good vision for the patients' lifetime, which will

sustain the quality of life [8]. In making the right decision for glaucoma surgery, the surgeon must consider the life expectancy of the patient, disease progression rate and the risk-benefit of the other therapy. The surgeon must weigh the surgical benefit such as the likelihood that the surgery will be successful, and prevent further visual loss against the risks of surgical failure and complications. Surgery should be used more frequently at an earlier stage, rather than as a last resort [9]. What needs to be kept in mind is the fact that vision loss from optic nerve damage is irreversible, while vision loss from a common glaucoma surgery complication can be corrected.

Filtration surgery is indicated when medical therapy fails to provide adequate control of intraocular pressure or when IOP is too high in spite of maximal tolerated glaucoma medication [10].

The aim of our study was to collect information about factors related to glaucoma disease at the time of surgery in the city of Novi Sad, Vojvodina, Serbia.

METHODS

This was an observational, retrospective clinical case-series study. This study was done at the Eye Clinic of the Clinical center of Vojvodina,

Received • Примљено:
March 28, 2018

Revised • Ревизија:
November 13, 2018

Accepted • Прихваћено:
January 2, 2019

Online first: March 12, 2019

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Novi Sad in the period between July 2011 and December 2014, and it was done in accord with standards of the institutional Committee on Ethics. Thirty-eight patients (38 eyes) who underwent filtration glaucoma procedures were analyzed in the study. Selected cases had the diagnosis of any type of open angle glaucoma, either primary or secondary, including POAG, normal tension glaucoma, XFG and pigment dispersion glaucoma.

Surgeons had collected the following variables from each patient on the last visit: age, sex, eye, best corrected visual acuity (BCVA), mean deviation of visual field (MD in dB), pattern standard deviation (PSD), IOP on the last visit (mmHg), number of used antiglaucoma drugs, glaucoma type and surgical procedures. Glaucoma was defined as either visual field defect or glaucomatous changes of the optic nerve head (neural rim loss, disc asymmetry, blood vessel changes, peripapillary atrophy). The visual field evaluation was performed using the Humphrey field analyzer- program 24-2 or 30-2 (Carl Zeiss Meditec AG, Jena, Germany) equipped with STATPAC. MD and PSD data was entered for statistical analysis in absolute values.

The data were coded and entered in a database. Statistical analysis was performed using the Statistical Package for Social Sciences. Standard statistical parameters and methods (descriptive statistics and frequency distribution) were used. Numerical data were presented using mean value and standard deviation (SD).

RESULTS

The mean age of all analyzed patients was 66.21 ± 17.92 years. Among them 57% were women and 43% were men. POAG was found in 60% (23/38), XFG in 37% (14/38), and pigmentary glaucoma in 3% (1/38) of patients. We recorded that all our patients had trabeculectomy with Mitomycin C as filtering procedure. The median number of used antiglaucoma drugs was 2.73, ranging from 1–4. More than 90% of patients were on two or more medications before surgery. 2.63% patients were on one medication, 38.84% were on two medications, 44.73% were on three medication and 15.78% were on four medications. Mean BCVA was 0.64 ± 0.68 and was oscillated from 0.1–1 (according to Snellen). There was 52.63% of patients who had $BCVA \geq 0.8$ (Table 1).

IOP on the final visit before surgery varied from 15–42 mmHg (minimum and maximum median values). Mean IOP was 26.10 ± 13.20 mmHg and were higher than 21 mmHg in 29/38 patients (76.31%) (Figure 1).

Visual field index MD showed minor and highest absolute values from -0.82 to -35.25 dB (mean MD -18 dB ± 19.15). Mean PSD value was 6.99 ± 6.27 and varied from 1.5 to 14.6 (Figure 2).

DISCUSSION

Our survey found that the level of damage in glaucoma patients before surgery is advanced in terms of visual field

Table 1. Visual function factors, IOP and preoperative number of drugs

Parameters	Mean \pm SD	Range (min–max)
Age (years)	66.21 ± 18.16	36–81
IOP (mmHg)	26.11 ± 13.20	15–42
BCVA	0.64 ± 0.68	0.01–1
MD (dB)	-18.01 ± 19.5	-35.52–(-0.82)
PSD	6.99 ± 6.27	1.5–14.6
Number of active drugs	2.74 ± 1.51	1–4

IOP – intraocular pressure; BCVA – best-corrected visual acuity; MD – mean deviation; PSD – pattern standard deviation

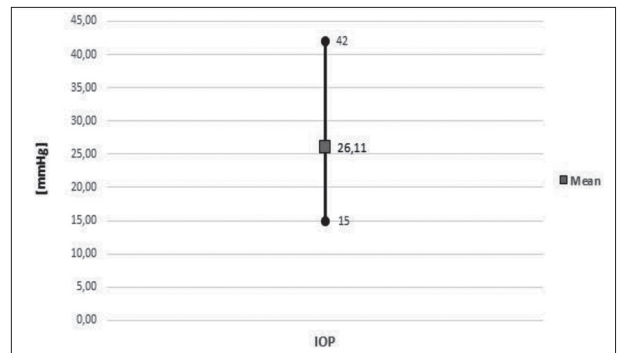


Figure 1. Intraocular pressure before the surgery

IOP – intraocular pressure

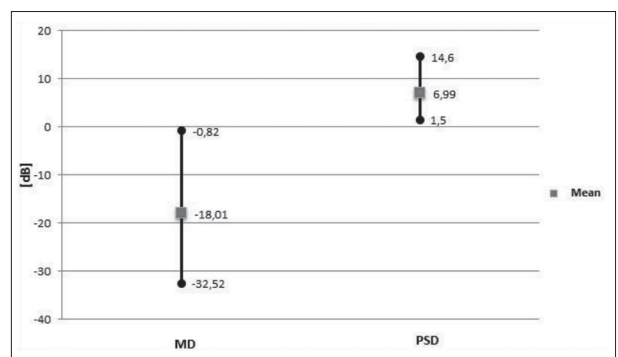


Figure 2. Stage of damage – visual function indices

MD – mean deviation; PSD – pattern standard deviation

loss. Mean visual field index was -18 dB, which is considered advanced visual field loss damage according to Hodapp Classification Staging [11]. Open angle glaucoma was classified as POAG and secondary open angle glaucoma (pseudoexfoliative and pigmentary). Sixty patients had POAG and 37% of patients had XFG. Such a high number of patients with XFG could be explained by the fact that many of them had more progression and more difficulty to control IOP [12]. Surgery is frequently done earlier among XFG patients in contrast to POAG. Nonetheless, studies have shown that the long-term success of trabeculectomy in XFG may be better than that documented with POAG [12].

In our study, women and elderly population were presented in higher number. More than 90% of patients were on two or more medication having in mind that three or more medications are considered the maximal medical antiglaucoma therapy.

Clinical decision making for glaucoma surgery depends on several factors. There are no general recommendations

for glaucoma surgery and for each patient many factors have to be taken into account when choosing a surgical treatment. In patients with POAG, the indications for surgery are the documented visual field and optic nerve damage that threatens the patient's vision, despite the maximal tolerated medication with or without previous laser surgery. IOP that is high enough to place the future health of optic nerve at significant risk is the important factor for surgical indication [13].

Theoretically, it will be more frequently indicated when the disease progresses in the context of maximal medical therapy and uncontrolled IOP, but surgeons can also recommend it either in the progressive patients at risk of vision threatening, despite an apparently well controlled IOP, or when IOP is unacceptable high regardless the functional status. Our survey found that more than 90% of patients were on two or more medication and only 15.78 % of patients were on maximal medical therapy showing that filtration surgery was not the last resort, which is not in correlation with the guidelines [9, 10, 14]. Analysis of IOP level before surgery also showed that when IOP is too high despite the level of visual function loss, surgeons could decide to perform filtering procedures regardless of stage of the damage [15].

The glaucoma staging applications nowadays allows automated, reproducible, and objective classification system for staging glaucoma damage for multiple 24-2 visual functions of Humphrey visual field. Recent publication was a proof of concept that could translate into useful tool to

analyze and stage visual functions more objectively [16]. Latest results regarding quality of life in glaucoma patients demonstrate that quality of life is impaired in patients with glaucoma and this alteration is greater the more advanced is glaucoma damage in the best or both eyes [17].

In the last few years, the authors continued to collect new data of the stage of glaucoma damage before the surgery and the study will be updated in near future.

CONCLUSION

Our survey found that the level of damage is advanced in terms of visual field loss. In most patients (52.63%) visual acuity was well preserved. POAG and XFG are the most frequent diagnosis. Women and elderly population were represented in higher number in our study. Level of IOP suggests a trend to make a surgical decision at higher pressure regardless the stage of glaucoma damage.

ACKNOWLEDGMENT

This survey was in part presented at EGS meeting in September 2–3, 2011 Malmo, Sweden as retrospective data collection on filtration glaucoma procedures performed in open-angle glaucoma around Europe in 2011.

Conflict of interest: None declared.

REFERENCES

- Gazzard G, Foster PJ, Devereux JG, Oen F, Chew PT, Khaw PT, et al. Intraocular pressure and visual field loss in primary angle closure and primary open angle glaucoma. *Br J Ophthalmol*. 2003; 87(6):720–5.
- Teus MA, Castejon MA, Calvo MA, Pérez-Salaices P, Marcos A. Intraocular pressure as a risk factor for visual field loss in pseudoexfoliative glaucoma and in primary open-angle glaucoma. *Ophthalmology*. 1998; 105(12):2225–9.
- Vogel R, Crick RP, Newson RB, Shipley M, Blackmore H, Bulpitt CJ. Association between intraocular pressure and loss of visual field in chronic simple glaucoma. *Br J Ophthalmol*. 1990;74(1):3–6.
- Davanger M, Ringvold A, Bilka S. The probability of having glaucoma at different IOP levels. *Acta Ophthalmol*. 1991;69(6):565–8.
- Martus P, Stroux A, Budde WM, Mardin CY, Korth M, Jonas JB. Predictive factors for progressive optic nerve damage in various types of chronic open-angle glaucoma. *Am J Ophthalmol*. 2005; 139(6):999–1009.
- The AGIS investigators. The Advance Glaucoma Intervention Study (AGIS): The relationship between control of intraocular pressure and visual field deterioration. *Am J Ophthalmol*. 2000;130(4):429–40.
- AGIS investigators. The Advance Glaucoma Intervention Study (AGIS). Baseline risk factors for sustained loss of visual field and visual acuity in patients with advanced glaucoma. *Am J Ophthalmol*. 2002; 134(4):499–512.
- Orta AÖ, Öztürker ZK, Erkul SÖ, Bayraktar Ş, Yılmaz OF. The correlation between glaucomatous visual field loss and vision-related quality of life. *J Glaucoma*. 2015; 24(5):121–7.
- Watson PG. When to operate in open-angle glaucoma. *Eye*. 1987; 1:51.
- Babić N. Fixed combination of glaucoma medications. *Srp Arh Cel Lek*. 2015; 143(9–10):626–31.
- European Glaucoma Society. Terminology and Guidelines for Glaucoma. 4th ed. Savona, Italy: PubliComm; 2014. p. 64.
- Holló G, Katsanos A, Konstas AG. Management of exfoliative glaucoma: challenges and solutions. *Clin Ophthalmol*. 2015; 9:907–19.
- Stamper RL, Lieberman MF, Drake MV. *Becker-Shaffer's diagnosis and therapy of the glaucomas*. 8th ed. Mosby-Elsevier; 2009. P. 462–5.
- Sethi HS, Naik MP, Saluja K. Role of trabeculectomy in advanced glaucoma: Whether we stand to consider it a bane or a boon today? *Int Ophthalmol*. 2017; 2019; 39(1):137–43.
- Sturmer JPE, Faschinger C. Do we perform glaucoma surgery too late? *Klin Monbl Augenheilkd*. 2018; 235(11):1269–77.
- Germano RAS, de Moraes CG, Susanna R Jr, Dantas DO, Neto EDS. Evaluation of a Novel Visual Field Analyzer Application for Automated Classification of Glaucoma Severity. *J Glaucoma*. 2017; 26(6):586–91.
- Pujol-Carreras O, Anton A, Mora C, Pastor L, Gudiña S, Maull R, et al. Quality of life in glaucoma patients and normal subjects related to the severity of damage in each eye. *Arch Soc Esp Oftalmol* 2017; 92(11):521–7.

Степен глаукомског оштећења пре хируршке интервенције

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САЖЕТАК

Увод/Циљ Циљ истраживања је био да се прикупе подаци о факторима који су повезани са глаукомским оштећењем код болесника пре хируршке интервенције у Новом Саду (Војводина, Србија).

Метод У ретроспективној студији анализирано је 38 болесника са глаукомом отвореног угла којима је извршена филтрациона операција на Клиници за очне болести Клиничког центра Војводине у периоду од јула 2011. до децембра 2014. За сваког болесника на последњој контроли пре хируршке интервенције прикупљени су следећи подаци: године старости, пол, најбоља коригована видна оштрина, индекси видног поља (*MD* и *PSD*), број лекова у терапији глаукома, врста глаукома и врста интервенције.

Резултати Просечна старост болесника у овој студији износила је $66, 21 \pm 17, 92$ година. Од укупног броја болесника било је 57% жена и 43% мушкараца. Примарни глауком отвореног угла имало је 60% (23/38), а псеудоексфолијативни глауком 37% (14/38) болесника. Просечан број коришћених антиглаукомских лекова износио је 2,73 и кретао се од 1 до 4. Више

од 90% болесника било је на два или више антиглаукомска лека пре оперативног лечења. Просечна најбоља коригована видна оштрина износила је $0,64 \pm 0,68$ у распону 0,1–1,0 (по Снелену). Интраокуларни притисак на последњем мерењу пре оперативног лечења кретао се 15–42 *mmHg* (просечан интраокуларни притисак је $26,11 \pm 13,20$ *mmHg*). Индекс видног поља имао је најмање и највеће апсолутне вредности $-0,82$ *dB* – $-35,25$ *dB* (просечан *MD* $-18,00 \pm 19,15$). Сви наши болесници имали су трабекулектомију са митомицином Це.

Закључак Наша студија је показала да болесници имају висок степен оштећења по индексу видног поља. Код највећег броја испитаника (52,63%) видна оштрина била је добро очувана. Примарни глауком отвореног угла и псеудоексфолијативни глауком биле су најчешће дијагнозе. У испитаној групи болесника већа је заступљеност жена и особа старије животне доби. Висина интраокуларног притиска сугерише тренд да се одлука о хируршкој интервенцији доноси код његових високих вредности, без обзира на степен оштећења.

Кључне речи: глауком; степен оштећења; хирургија