

Traumatic Glaucoma

R. Stanić and R. Stanić

Clinical Hospital Split, Department of Ophthalmology, Split, Croatia

ABSTRACT

The authors present the frequency, clinical forms and therapeutic results of traumatic glaucoma in 511 injured eyes. Traumatic glaucoma was found in 6.6% of the injured eyes, more frequently in contusions than in perforating lesions of the eye. One third of the patients with traumatic glaucoma were blind and one half had visual acuity below 0.1. The time elapsed between the injury and the diagnosis of traumatic glaucoma ranged from 1 hour to 30 years.

Introduction

Traumatic glaucoma is a secondary glaucoma and it indicates the severity of the eye injury. It appears in 5–10% of the injured eyes. Glaucoma may appear in different clinical forms and in different periods after injury. It appears immediately after injury in a form of acute glaucoma or later as chronic angular glaucoma due to goniosynechiae or as monocular simplex glaucoma. This may cause difficulties in making the ethiological diagnosis¹⁻⁴.

Since eye injuries may be of a non-perforating or perforating origin, with or without foreign body, the onset of traumatic glaucoma may differ. In the eye contusion, as the liquid content of the eye is noncompressed, the hydrodynamic blow is being transmitted to the internal structures causing iridodialysis, angle recess, bleeding into the anterior chamber

and vitreous, zonulorexis with subluxation and luxation of the lens, and damage to the choroid and retina¹⁻⁶.

Due to a prolapse of corpus vitreum, lens masses and blood, obstruction of the angle chamber and pupillary block may develop, with a rapid increase of intraocular pressure (IOP).

In perforating eye injuries, as a result of anatomical changes, fibrous proliferation with goniosynechiae, adherence, leucomas, and posterior synechiae due to iritis, chronic angular glaucoma develops¹⁻³.

Retained intraocular metal foreign bodies cause damage to the trabecular meshwork and influence the development of glaucoma simplex¹.

Epithelial ingrowth to the anterior chamber after perforating injuries, with chamber angle coverage or the formation of epithelial cysts, influences the development of angular glaucoma⁷.

In this study we present the frequency, clinical forms and types of therapy of traumatic glaucomas treated at the Department of Ophthalmology, Split, during the period of 1995–1999.

Material and Methods

During the 1995–1999 period 10.080 patients were treated at the Department of Ophthalmology, Clinical Hospital Split. There were 511 (5.7%) patients with mechanical injuries. All injured eyes were submitted to visual acuity examination, gonioscopy, anterior segment examination, funduscopy, intraocular pressure measurement, and perimetry.

TABLE 1
FREQUENCY OF TRAUMATIC GLAUCOMA IN THE PERIOD 1995–1999

	No. of traumas	No. of glaucomas	%
Contusion	312	25	8
Perforation	199	9	4.5
TOTAL	511	34	6.6

TABLE 2
CLINICAL TYPES OF TRAUMATIC GLAUCOMA

Acute	Chronic	
	Congestive	Simplex
11	17	6

TABLE 3
TIME ELAPSED BETWEEN INJURY AND HOSPITAL TREATMENT OF TRAUMATIC GLAUCOMA

Time	1–24 hours	2–10 days	11–31 days	1–12 months	1–4 years	5–30 years
No. of glaucomas	6	7	2	6	2	11

Results

Traumatic glaucoma was found in 34 (6.6%) injured eyes (Table 1). It was more frequent in eye contusions (25 or 8%) than in eye perforations (9 or 4.5%). The patients with traumatic glaucoma were 9–86 years of age (mean 60.2). There were 20 males and 14 females. Different clinical forms of traumatic glaucoma are given in Table 2. The most frequent form of traumatic glaucoma was chronic congestive glaucoma. The time elapsed between the injury and the diagnosis of traumatic glaucoma ranged from one hour to 30 years (Table 3). While 15 (44.1%) cases of traumatic glaucomas were diagnosed and treated within one month after injury, 13 (35,2%) patients were first diagnosed 1 to 30 years after injury. Anatomical changes of the anterior segment of the eye showed that one third of the patients with secondary glau-

coma had dislocated lens. Hyphema was present in only 8.8% of glaucomas, although it was found in 50% of the injured eyes (Table 4). All patients were medically treated. Eighteen (52.9%) patients required surgical treatment (Table 5). The mean IOP value before therapy was 5.1 kPa (38.2 mmHg) and after therapy 2.7 kPa (20.25 mmHg), indicating the efficacy of regulation of intraocular pres-

TABLE 4
ANATOMICAL CHANGES OF TRAUMATIC GLAUCOMA

Hyphema	3	8.8%
Lens subluxation	6	17.6%
Lens luxation	7	20.5%
Goniosynechiae	8	23.5%
Angle recession	4	11.7%
Adherent leucoma	4	11.7%
Iridodialysis	2	5.8%

TABLE 5
THERAPY OF TRAUMATIC GLAUCOMA

Clinical types of traumatic glaucoma	Medical therapy	Medical and surgical	
		Cataract extraction	Trabeculectomy
Acute	6	3	2
Chronic congestive	8	5	4
Simplex	2	/	4
TOTAL	16	8	10

TABLE 6
VISUAL ACUITY OF 34 PATIENTS WITH TRAUMATIC GLAUCOMA

Visual acuity	Before treatment		After treatment	
		%		%
Amaurosis	6	17.64	6	17.64
Light projection	13	38.23	5	14.70
0.01–0.1	11	32.35	14	41.17
0.2–0.4	1	2.94	3	8.82
0.5–0.9	3	8.82	5	14.70
1.0		/	1	2.94

sure. However, the values of visual acuity before and after treatment did not show any significant changes (Table 6). One third of all patients with secondary glaucoma was blind and one half had visual acuity below 0.1.

Discussion

The frequency of eye injuries is on the increase, making about 10% of all hospitalily treated ophthalmic patients. One of the most difficult complications of the injured eye is traumatic glaucoma, found in 6.6% of our traumatized eyes. Since one third of the traumatic glaucoma patients had eye injury 1–30 years before the onset, the importance of regular controls of all injured eyes over a prolonged period of time, in order to detect traumatic glaucoma in its initial stage, is evident. Monocular simplex glaucoma developing in a previously traumatized eye may be a diagnostic problem⁴. Recession

of a minor part of the angle, without damage to the corneoscleral meshwork, does not influence the development of glaucoma⁸. Among 11 traumatic glaucomas presenting as acute glaucomas, the lens was subluxated in 9, whereas hyphema was present in only 2. Prolonged hyphema and recurrent bleeding may cause organic changes in the angle with the appearance of goniosynechia. Therefore, every hyphema should be surgically treated if it did not resorb within a week^{1,3,5,9}.

According to Ready, the frequency of glaucoma in recurrent bleeding increases by 50%⁵. Some authors present the effective use of antifibrinolytic agents in the prevention of recurrent bleeding¹⁰. Deep sclerectomy with collagen implant and argon laser cyclophotocoagulation shows good results in the regulation of intraocular pressure^{11,12}.

Glaucoma is more frequent in eye contusion (8%) than in perforating eye injuries (4.5%). The mean age of patients

with traumatic glaucoma was considerably high, which means that the predisposing factors of a patient greatly influence the development of traumatic glaucoma, together with the intensity of trauma. Results of traumatic glaucoma therapy in the regulation of intraocular pressure were successful, but functional results suggested traumatic glaucoma to be a very difficult form of glaucoma.

Conclusion

Traumatic glaucoma presents one of the most difficult complications of eye in-

juries. It may appear in the early post-traumatic period or many years after injury. In this study, the frequency of traumatic glaucoma was 6.6%. One half of these cases were diagnosed within a month after injury and one third 5–30 years after injury. Luxation or subluxation of the lens was observed in 35% of patients with traumatic glaucoma. One third of these patients were blind and one half had visual acuity below 0.1. Patients with eye injuries should be observed and controlled for many years, so as traumatic glaucoma would be detected and properly treated in time.

REFERENCES

1. EPSTEIN, D.: (Ed.) Chandler and Grent's Glaucoma. (Philadelphia: Lea Fabiger, 1986). — 2. WITMER, R., *Kl Mbl Augenheilk*, 189 (1986) 187. — 3. ČUPAK, K., *Acta Ophthalmol Yugosl*, 8 (1970) 486. — 4. CVETKOVIĆ, D., D. KONTIĆ, B. ILIĆ, *Fortschr Ophthalmol*, 81 (1984) 573. — 5. READ, J., *Ann Ophthalmol* 7 (1975) 659. — 6. KEARNS, P., *Brit J Ophthalmol*, 75 (1991) 137. — 7. ZAGORSKI, Z., H. SHRESTHA, G. LANG, G. NAUMANN, *Kl. Mbl. Augenheilk* 193 (1988) 16. — 8. BUBLIK-BRDARIĆ, M.: Mogućnost ranog otkrivanja kontuzionog glaukoma

ispitivanjem funkcije komornog kuta. Medicinski fakultet Sveučilišta u Zagrebu 1988. Disertacija. — 9. THOMAS, M., R. PARISSH, W. FEUER, *Arch Ophthalmol* 104 (1986) 206. — 10. USITALO, R., L. RAMTA-KEMPPAINEN, A. TARKANEN, *Arch Ophthalmol* 106 (1988) 1207. — 11. CHIN, G., A. MERMOUD, A. JEWELEWICZ, *Graefes Archive for Clinical and Experimental Ophthalmology*, 236(8) (1998) 593. — 12. KIM, D., R. MOSTER, *Journal of Glaucoma* 8 (5) (1999) 340.

R. Stanić

*Clinical Hospital Split, Department of Ophthalmology, Spinčićeva 1,
21000 Split, Croatia*

TRAUMATSKI GLAUKOM

SAŽETAK

Autori iznose učestalost, kliničke oblike i rezultate liječenja traumatskog glaukoma kod 511 povrijeđenih očiju. Traumatski glaukom nađen je u 6.6% povrijeđenih očiju, češće kod kontuzija nego kod perforativnih povreda oka. Kod jedne trećine pacijenata s traumatskim glaukomom nastupila je sljepoća, dok je polovina njih imala vidnu oštrinu ispod 0.1. Vrijeme proteklo od nastanka povrede do dijagnoze traumatskog glaukoma variralo je u rasponu od jedan sat do trideset godina.