A RARER FORM OF ANGLE-CLOSURE GLAUCOMA - DIAGNOSIS AND TREATMENT


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Abstract

Purpose: to show how we diagnosed and treated a rarer form of angle-closure glaucoma; the pathogenic mechanism was angle crowding through thick peripheral iris roll.

Methods: we show the investigations: biomicroscopy of the fundus, tonometry, pachymetry, gonioscopy, perimetry, ultrasound biomicroscopy, optical coherence tomography of the anterior segment – that helped us to diagnose the angle-closure glaucoma and its pathogenic mechanism; we also show our choice for surgery – lens extraction – and our arguments for this choice.

Results: first postoperative day – intraocular pressure was 14 mmHg; a week postoperatively - intraocular pressure was 13 mmHg; three months postoperatively - intraocular pressure was 13 mmHg.

Conclusions: lens extraction may be a very good choice in several forms of angle-closure glaucoma.

Key Words: angle-closure glaucoma, lens extraction

We present the case of a 40-year-old woman, of Mongoloid race, who was sent to us for an ophthalmological examination.

The history of this case is quite long, but very interesting and instructive.

One year previously, when the patient presented for prescription reading glasses, the ophthalmological examination showed:

- Visual acuity:
  - O.D.: 20/20 Snellen (0.0 log MAR)
  - O.S.: 20/20 Snellen (0.0 log MAR)

- Intraocular Pressure:
  - O.D.: 30 mmHg.
  - O.S.: 24 mmHg.

- An OCT of the optic nerve head was performed and it showed some defects in nerve fiber layer in both eyes.
An OCT image of the anterior segment of the eye showed a narrow angle in both eyes: O.D. 16°, O.S. 16°

The diagnosis was: O.U.: Angle-closure glaucoma and the patient was started on: timolol-dorzolamide drops b.d., with monthly ophthalmological assessments.

Eight months previously, the patient was hospitalized with the diagnosis: O.D. Acute angle-closure glaucoma. She could not specify the medical treatment she was on and she was released on the following treatment:
- timolol-dorzolamide drops b.d.
- pilocarpine 2% drops, five times per day

Six months previously, she was hospitalized again. The diagnosis was: O.D.: Acute angle-closure. After three days of medical treatment, peripheral laser iridotomies were performed in both eyes.

One month previously, she was once again hospitalized. Ophthalmological examination showed:

- Visual acuity:
  - O.D.: 20/20 Snellen (0.0 logMAR)
  - O.S.: 20/20 Snellen (0.0 logMAR)
- Intraocular Pressure:
  - O.D.: 20 mmHg
  - O.S.: 17 mmHg
- Ocular refraction:
  - O.D.: + 2.75 / + 0.25 * 90°
  - O.S.: + 3.25 / + 0.75 * 95°
- Biomicroscopy of the anterior segment:
  - O.D.: shallow anterior chamber, clear lens, iridotomies at 3 and 9 o’clock
  - O.S.: shallow anterior chamber, clear lens, iridotomies at 3 and 9 o’clock

The diagnosis was: O.D.: Posner-Schlossman syndrome. The treatment consisted of systemic prednisolone 48 mg/day and acetazolamide 250 mg b.d. and timolol-dorzolamide b.d. instillations. The evolution was not very good, with a faint reduction of intraocular pressure. After three days of treatment, pilocarpine 2% five times per day was prescribed and the intraocular pressure normalized.

The ophthalmological examination in our clinic was:

- Visual acuity:
  - O.D.: 20/20 Snellen (0.0 logMAR)
  - O.S.: 20/20 Snellen (0.0 logMAR)
- Intraocular Pressure:
  - O.D.: 20 mmHg
  - O.S.: 17 mmHg

Fig. 1 The OCT image of the optic nerve head

Fig. 2 OCT image of the anterior segment O.D.

The OCT image of the anterior segment O.D.

Fig. 3 Anterior segment O.D.
• Fundus examination:
  - O.D.: large cup of the optic disc, with vertical diameter larger than horizontal diameter, cup/disc ratio 0.6, narrow inferior neuroretinal rim.
  - O.S.: large cup of the optic disc, with vertical diameter larger than horizontal diameter, cup/disc ratio 0.7, narrow inferior neuroretinal rim.

• Gonioscopy:
  - O.D.: Schwalbe line was visible; the upper part of trabeculum was visible around 180°; the peripheral iris configuration was steep (convex), allowing a very difficult angle examination.
  - O.S.: Schwalbe line was visible; the upper and lower part of trabeculum were visible around 270°; the peripheral iris configuration was also steep.

• A Scheimpflug camera examination of the anterior segment of the eyes showed:
  - O.D. angle: 16.9°
  - O.S. angle: 15.6°
Automated perimetry:
- O.D.: changes were especially in the superior hemifield: nasal step, superior arcuate scotoma; the glaucoma hemifield test was outside normal limits; mean deviation: 5.75 dB; pattern standard deviation: 4.34
- O.S.: changes were less important; glaucoma hemifield test was outside normal limits; inferior arcuate scotoma; mean deviation: 4.51 dB; pattern standard deviation: 2.84

Our diagnosis was: O.U.: Intermittent angle closure glaucoma.

The reasons for the diagnosis were:
- aspects of gonioscopy
- visual field changes
- optic nerve head changes
- normal intraocular pressure in many examinations
- the prompt efficacy of pilocarpine treatment

Differential diagnosis:
- open angle glaucoma: the gonioscopy, the narrow angle (around 15°) in Scheimpflug camera imaging and also the sudden response of high intraocular pressure to pilocarpine instillation, contradicted this diagnosis
- other forms of angle-closure glaucoma:
  - with pupillary block: the patient had two patent iridotomies in both eyes
  - without pupillary block:
-malignant glaucoma: this form of angle-closure glaucoma appears generally postoperatively; it can appear spontaneously only in case of a very important zonular laxity (this was not our case)
-plateau iris configuration
-angle crowding

We believe that the last option – angle crowding – was the case in our patient.

Taking this into consideration, we will further discuss about the mechanism of angle-closure in this case.

There were more treatment options available:
- long term pilocarpine instillation
- surgical iridectomy
- trabeculectomy
- clear lens extraction

We chose the clear lens extraction. The surgery was done as usual, with only a change in the routine technique: no pharmacological mydriasis before surgery (use of iris retractors instead).

Postoperative results:
Day 1:
- Visual acuity O.D.: 20/20 Snellen (0.0 log MAR)
- Intraocular pressure O.D.: 14 mmHg
- Anterior chamber depth: 4 mm

Day 14:
- Visual acuity O.D.: 20/20 Snellen (0.0 log MAR)
- Intraocular pressure O.D.: 12 mmHg
- Anterior chamber depth: 3.88 mm
- Angle: 28°

Ultrasound biomicroscopy shows a larger angle, a deep anterior chamber and a more flat iris.

Prognosis: we consider that for a short and medium period of time it will be good. One year after the surgery, the visual field had no change and the visual acuity was 17 mmHg, without medication. An unusual situation was that the patient refused the same surgery in O.S. She preferred pilocarpine instillation five times per day; the evolution of this eye was also good.

Discussions

The studies about the epidemiology of glaucoma suggest a much greater rate of open angle glaucoma compared to angle-closure glaucoma in Caucasian population [8,1]. More recent epidemiologic studies in Asia reported that Mongolian and Chinese had significantly higher rates of angle closure glaucoma [3,4]. Our patient, very unusual for Romanian people, was a patient of Mongolian race.

The first issue we want to discuss is the mechanism of angle-closure in this patient. It is well known that pupillary block is the commonest mechanism for angle closure. In pupillary block, iridolenticular contact at the pupil limits the flow of aqueous from the posterior chamber to the anterior chamber, resulting in a pressure gradient between posterior and anterior chamber that pushes the iris anteriorly. Anterior bowing of the peripheral iris narrows the angle and may cause iridotrabecular apposition. Laser iridotomy
reestablishes aqueous flow from the posterior to the anterior chamber, allowing the iris to flatten and the angle to widen [10].

The variable efficacy of laser iridotomy in many cases of angle closure or angle-closure glaucoma suggests that pupillary block may not be the only mechanism responsible [5]. Our patient had in both eyes two patent iridotomies. So we looked for other mechanisms for angle-closure.

Plateau iris configuration is a condition where the peripheral iris is forced into the angle by anterior rotation of the ciliary body or anteriorly positioned ciliary processes [10]. Plateau iris syndrome is the situation where angle-closure appears spontaneously or after pupil dilatation in an eye with plateau iris configuration, in a patient with patent laser iridotomy [2,9]. Our patient had angle-closure, but she did not have a deep central anterior chamber, as in plateau iris configuration. She also had a different appearance on ultrasound biomicroscopy than the classical image of plateau iris configuration.

Fig. 12 Plateau iris configuration – anterior rotation of ciliary processes [10]

In angle crowding the peripheral iris is thick. Upon iris dilatation the peripheral iris bunches up; if the angle is already narrow, this thick peripheral iris roll becomes opposed to the trabecular meshwork and raises suddenly the intraocular pressure [10]. Our patient had a brown iris with a thick stroma. This aspect, the presence of a patent iridotomy and the aspect on ultrasound biomicroscopy convinced us to choose this mechanism as the mechanism of angle-closure in our patient.

Fig. 13 Ultrasound biomicroscopy O.D.

The second issue to discuss is how to treat more efficiently this patient.

Pilocarpine instillation seems to be effective; every time the patient used pilocarpine the intraocular pressure became normal. However, we consider that this drug has a lot of adverse reactions in a young person: changes in accommodation, headache, the need to instill the drops five times a day and many others.

Surgical iridectomy – we considered that laser iridotomies were quite large and patent, so that the surgical iridectomy would fail to control the intraocular pressure when the pupil dilate as the iridotomies did.

Trabeculectomy would probably be efficient to control intraocular pressure, but is unclear for how long. Our patient is young and this is a clear risk factor for trabeculectomy failure. Trabeculectomy has also many complications both intraoperatively (choroidal detachment and hemorrhage) and postoperatively (atalamia, malignant glaucoma, intraocular infection). Another argument against trabeculectomy is the fact that the trabeculum seems to work properly - when the patient uses pilocarpine, the intraocular pressure is good.

Clear lens extraction has some advantages: it is a very well known surgery, with very good outcome; the surgery enlarges the angle; the intraocular lens implant is thinner (3-4 times) than the natural lens and its position is clearly more posterior, so the pupillary block is
very improbable; the enlargement of the angle does not permit that the base of the iris (although it is thick) to oppose the trabeculum. If the trabeculum works well – and it does, we showed this previously – clear lens extraction can solve the mechanism of angle closure in our patient. There are also some disadvantages, especially accommodation loss. Our patient cannot afford a multifocal intraocular lens, but she is near the presbyopic age, so she can use near glasses.

Our option seemed to be efficient. One year postoperatively, the patient showed no increase in intraocular pressure and had a stable visual field. On the other hand, we must specify that the patient’s choice for the left eye – pilocarpine instillation five times per day – seems to be effective as well.

The last issue to discuss is the delay in a proper treatment for this patient. Although the diagnosis was made quickly, she received a treatment that was not very efficient. Part of the initial treatment was suitable for open angle glaucoma, not for angle-closure – timolol instillation for instance. Later, iridotomies were performed, but intraocular pressure kept on raising. A major conclusion of this case is that is very important to discover the mechanism of angle-closure, because otherwise another sudden raise in intraocular pressure is possible.

References