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Viscogonioplasty in patients with chronic narrow angle glaucoma

Chronic narrow angle glaucoma (CNAG) occurs when the anterior chamber drainage angle progressively narrows with a subsequent rise in intraocular pressure (IOP) and, if this rise is maintained, glaucomatous optic neuropathy. Although there may be a number of reasons for this narrowing, if the peripheral iris remains apposed to the trabecular meshwork for any length of time it is likely that a more permanent adhesion occurs (PAS). Thus even though the underlying cause for the narrowing is removed—for example, pupillary block after peripheral iridectomy (PI) or cataract extraction in lens induced disease, the angle remains closed and the IOP remains damagingly high.

We have previously described a technique for use in acute angle closure glaucoma where the lens induced narrowing is removed by cataract extraction and the PAS broken with viscoelastic. This manoeuvre has been called viscogonioplasty (or VGP).¹ This case series describes the results of this same technique in patients with chronic narrow angle glaucoma

Case series

From April 2002 to March 2005 all patients with CNAG inadequately controlled on conventional therapy were enrolled. The inclusion criteria were as follows:

- Occludable angle confirmed by gonioscopy
- Evidence of uncontrolled IOP (raised IOP, progressive glaucomatous optic neuropathy, and/or visual field progression)
- Previous patent PI.

An occludable angle was defined as the angle in which the posterior (usually pigmented) trabecular meshwork was seen for less than 90° of the angle circumference.²

Exclusion criteria included:

- Plateau iris syndrome
- Previous glaucoma surgery (argon laser trabeculoplasty/trabeculectomy)
- Retinal disease
- History of ocular injury
- Other glaucomas.

The duration of increased IOP or synechial angle closure was not one of our inclusion or exclusion criteria. However, all patients in the case series had been diagnosed and treated for at least 3 years. None of the patients had any stigmata of acute angle closure or an acute episode of raised IOP precipitating their initial presentation.

Preoperatively and postoperatively, all patients underwent complete ocular examination. The number of glaucoma medications taken by each patient was recorded preoperatively and at the latest clinic visit. The same

surgeon performed phacoemulsification and VGP in all the cases. Consent was given by all patients before the operation.

All patients underwent routine phacoemulsification under topical anaesthetic. Following IOL implantation a heavy viscoelastic was used to deepen the anterior chamber and then injected near the angle without touching the trabecular meshwork. No surgical instrument was used to physically break the PAS. Upon completion of VGP the viscoelastic was meticulously removed. Postoperatively, topical steroid and non-steroidal drops were given four times a day in the operated eye for 1 month. All glaucoma medications were discontinued postoperatively and then restarted according to IOP response.

In all, 29 eyes of 18 white patients with poorly controlled narrow angle glaucoma underwent VGP in the study. The mean age of patients was 71.1 years (range 53–95 years). The mean IOP before surgery was 27.4 mmHg. The patients were followed up for at least 6 months. Mean follow up of patients was 7 months (range 6–24 months).

Following phaco-VGP the mean IOP was reduced from 27.4 mmHg to 12.2 mmHg at 6 month review; 6/29 (21%) eyes completed 1 year follow up and mean IOP at 1 year was 11.8 mmHg. None of the patients needed subsequent trabeculectomy or any other surgical intervention to lower IOP. 25/29 eyes (86%) were controlled without any antiglaucoma therapy. Of the remaining four patients none of them were on more than one topical medication.

Postoperatively gonioscopy showed opening of angle with absence of PAS in all cases.

Table 1 Results of CNAG patients undergoing phacoemulsification and VGP

Case No	IOP (mm Hg)		Preop glaucoma medication	Postop IOP (mm Hg)			Postop glaucoma medication
	IOP at presentation	Immediate preop on treatment		2 weeks	3 months	6 months	
1	34	28	2	17	17	11	0
2	40	27	2	17	18	12	0
3	28	25	4	13	15	10	1
4	48	32	4	9	16	16	1
5	34	20	3	17	12	12	0
6	34	29	3	12	13	13	0
7	42	28	2	14	12	12	0
8	62	40	2	14	18	14	0
9	26	24	2	12	14	11	0
10	30	20	2	17	12	10	0
11	25	22	2	22	20	12	0
12	34	27	3	19	11	11	0
13	31	20	3	17	12	10	0
14	36	30	2	15	16	15	0
15	32	28	2	20	22	18	0
16	42	32	4	12	14	12	0
17	35	28	4	12	13	12	0
18	54	45	2	8	12	12	0
19	43	32	4	18	14	12	0
20	42	20	2	12	16	10	0
21	29	24	3	20	13	13	0
22	36	26	2	12	10	10	0
23	35	29	3	15	15	11	1
24	37	25	3	15	15	12	1
25	36	25	1	18	14	14	0
26	39	30	4	15	18	11	0
27	38	29	4	11	11	12	0
28	30	25	3	10	13	12	0
29	31	25	2	20	19	16	0
Mean IOP (mm Hg)	29.5	27.4		14.9	14.6	12.2	

Three of the later patients underwent intraoperative gonioscopy, which was performed after cataract extraction but before the VGP and it was observed that a variable amount of PAS remained after cataract removal but was broken during VGP.

There were no intraoperative complications in this cohort of patients. Visual acuity (VA) remained unchanged in seven eyes, improved by one Snellen line in seven eyes, by two to four Snellen lines in 12 eyes and more than four Snellen lines in two eyes. VA did not worsen in any patient following phaco/IOL and VGP.

Comment

It is difficult to be precise about the mechanisms of narrow angle in all eyes.² It may well be that a combination of some or all of a number of factors—for example, small eyes, large lenses, abnormal insertion of the iris, or adhesion of iris to lens, is responsible for the narrowing. Whatever the mechanisms that produce these “occludable” angles, removal of the underlying cause does not inevitably result in decrease in IOP. The main reason for this is the presence of residual PAS and the results of this study indicate that by performing VGP the PAS can be broken with a subsequent fall in the IOP.

It seems likely that the eyes of the patients described in our study had, as an initial mechanism, lens induced narrowing of their drainage angles, which led to subsequent iridotrabecular adhesions. To form this more homogeneous group we excluded patients with obvious iris plateau and all patients had had a laser PI so that pupillary block was excluded. Although the effect of cataract extraction in this group of patients has been shown to be relatively effective in lowering pressure it has also been shown that in glaucoma associated with extensive PAS, removal of lens alone may be insufficient for adequate IOP control.^{3,4} Because of this, several glaucoma procedures have been advocated to open the angle in patients with extensive PAS including cutting and lasering of the synaechiae.^{1,5–7} However complications reported from these “direct” angle procedures include mild to severe haemorrhage from iris or trabeculum, fibrin exudation, choroidal haemorrhage, choroidal detachment, and shallow anterior chamber.⁸

The technique we have described, viscogonioplasty, has the advantage over the techniques above in that viscoelastic instead of a surgical instrument is used to break PAS. The angle itself is never touched but is gently dissected open by the viscoelastic. For this reason we think VGP is safer than surgical procedures on the angle and with potentially less damage to the trabecular meshwork. There does, however, remain a possibility that a trabecular meshwork that has been occluded for some time, even though the angle becomes anatomically opened by this procedure, does not resume full function. The fact that four of our patients still required IOP lowering medication suggests this is a possibility. Long term studies will make this clearer.

The fact that cataract extraction itself can reduce IOP in patients with narrow angle needs to be taken into consideration when looking at the efficacy of VGP. There are a number of reasons why we think that VGP offered additional IOP lowering over cataract extraction alone:

- (1) The IOP reductions shown in table 1 are around 4–5 mmHg more than we found in our own CNAG patients undergoing cataract surgery alone before our use of VGP.
- (2) The IOP decrease and reduction in numbers of antihypertensive medications described in our study are generally more than that described in the literature for cataract surgery alone in NAG.^{4,9–11}
- (3) Although only performed in the last three patients of this study, intraoperative gonioscopy showed residual PAS after cataract removal, which was absent after VGP.

Of course it is difficult to know the true relative contributions of cataract extraction and VGP to the IOP reduction in a consecutive case series study. For this reason we are designing a randomised control trial to compare eyes with NAG who have cataract extraction with and without VGP. This will also reduce the problem of accurately diagnosing the underlying cause of the occluded angle—our recent experience with VGP has suggested that it also has a role in IOP reduction in other narrow angle situations such as plateau iris and PAS associated with inflammatory glaucomas. It may be that although there are a number of mechanisms that can lead to narrowing of the angle a common end point is PAS. At present, because of its safety and potential benefit, we suggest all eyes with narrow angles—with or without obvious PAS—that are undergoing cataract extraction, should also have VGP.

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Acanthamoeba detection in the anterior chamber

Among the spectrum of infectious keratitis, acanthamoeba keratitis (AK) represents one of the most difficult entities to diagnose and to treat properly, thus threatening the visual function. It affects immunocompetent patients and the main risk factors for the development of AK are the use of contact lenses, the exposure to contaminated water or contact lens solution, and corneal trauma.¹ Clinically, this infection may appear as corneal stromal infiltrates, recurrent epithelial erosions, disciform keratitis, and kerato-neuritis. An anterior uveitis and/or a hypopyon may be present too. The diagnosis is usually made by scraping and culturing the corneal tissue and by performing a corneal biopsy if the epithelium is intact.

We report the case of a patient with an AK diagnosed by culturing the hypopyon. We would like to emphasise the value of this procedure in making the diagnosis in patient suffering from AK.

Case report

An 81 year old woman patient was admitted to the uveitis unit of the Geneva University Hospital with ocular pain, ocular redness, and blurring of vision affecting her right eye (RE) over the previous 2 days. She wore soft contact lenses and had no other ophthalmological co-morbidity. Her medical history was unremarkable. She was not receiving any systemic treatments, apart from Reminyl (galantamine hydrobromide) because of a mild Alzheimer's disease. Ophthalmological examination revealed a visual acuity less than 0.01 at presentation. Anterior segment examination disclosed a diffuse ciliary injection, a corneal abscess with an oedema, and an 0.5 mm hypopyon. It was not possible to examine the fundus because of the anterior chamber inflammation.

On the day of admission, an anterior chamber tap and corneal scrapings were performed (aerobes, anaerobes, fungi, acanthamoeba). Both contact lenses were sent for culture. An empiric topical treatment of ofloxacin and garamycin was started at the same time. Progress was favourable with a decrease of the hypopyon and healing of the abscess. The aqueous humour bacteriological cultures were negative. On day 6 culture of the anterior chamber tap gave positive results for AK. The antibiotic drops were stopped and a topical treatment of Brolene and chlorhexidine was started. Furthermore, the corneal scrapings were positive after 15 days. Healing was satisfactory and the patient was discharged from the hospital on day 15. At the end of follow up (11 months), she presented with a calm anterior chamber and corneal scarring, with a visual acuity of 0.4.

Comment

Acanthamoeba spp is an ubiquitous amoeba and an opportunistic pathogen found world-