Efficacy of goniosynechialysis in the treatment of chronic angle-closure glaucoma: a five-case report

**Eficácia da goniossinequiálise no tratamento do glaucoma crônico de ângulo fechado: relato de cinco casos**

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**ABSTRACT**

We retrospectively analyzed the clinical data of five patients with chronic angle-closure glaucoma who underwent goniosynechialysis (GSL). The patients presented a circumferential synechial angle-closure for less than or up to six months due to an acute primary angle-closure and a minimum six month follow up after GSL. After an average follow-up was of 32.4±13.9 months, visual acuity improved in four (80%) eyes. Before GSL, the intraocular pressure (IOP) varied from 34 to 58 mmHg. After GSL, the IOP varied from 8 to 44 mmHg. IOP was normalized by GSL with or without medication in 80% of the eyes. Before GSL, all patients were on maximum antiglaucomatous treatment including the use of 250 mg of oral acetazolamide three times daily. After GSL, three patients no longer required antiglaucomatous medication and one needed to use one topical antiglaucomatous medication. GSL was effective and safe in four patients and unsuccessful in one patient. An increase of the GSL success rate occurs when it is associated with phacoemulsification and intraocular lens implantation.

**Keywords:** Glaucoma/surgery; Intraocular pressure; Ophthalmologic surgical procedures; Treatment outcome.

**RESUMO**

Analisamos retrospectivamente os dados clínicos de cinco pacientes com seio camerular fechado por sinéquias anteriores periféricas (SAP) secundárias à crise aguda de fechamento angular primário e submetidos à goniossinequiálise (GSL). Os pacientes apresentavam fechamento sinéquial circunferencial por seis meses ou menos e foram acompanhados, no mínimo, por seis meses após a GSL. Após um acompanhamento médio de 32.4±13.9 meses, a acuidade visual melhorou em quatro (80%) olhos. Antes da GSL, a pressão intraocular (Po) variou de 34 a 58 mmHg. Após a GSL, a Po variou de 8 a 44 mmHg. A Po foi normalizada pela GSL com ou sem medicação em 80% dos olhos. Antes da GSL, todos os pacientes estavam sob tratamento antiglaucomatoso máximo incluindo o uso de 250 mg de acetazolamida por via oral três vezes ao dia. Após a GSL, três pacientes não mais necessitaram de medicação antiglaucomatosa e um paciente necessitou usar apenas uma medicação tópica antiglaucomatosa. A GSL foi eficaz e segura em quatro pacientes e não foi eficaz em um paciente. Ocorre um aumento da taxa de sucesso da GSL quando ela é associada à facoemulsificação com implante de lente intraocular.

**Descritores:** Glaucoma; Pressão intraocular; Procedimentos cirúrgicos oftalmológicos; Resultado de tratamento.

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INTRODUCTION

Chronic angle-closure glaucoma (CAGC) is characterized by the permanent angle-closure resulting from peripheral anterior synchiae (PAS) (1). In many eyes that have undergone one or more episodes of acute primary angle-closure (APAC), the appearance of PAS is a consequence of the transformation of the appositional closure of the angle into a permanent closure. Peripheral anterior synchiae may also have other causes (uveitis, ocular trauma, post operative complications of glaucoma or cataract surgery or keratoplasty etc.) (1).

Treatment of CAGC remains challenging and in general, many eyes with this type of glaucoma become blind because the intraocular pressure (IOP) is extremely elevated and refractory to clinical treatment. The elevated IOP cannot be reduced to normal levels even under maximum topical antiglaucomatous treatment and/or conventional antiglaucomatous surgery (trabeculectomy with antimotic).

Goniosynechialysis (GSL) is a surgical procedure that aims to cut the PAS from the trabecular meshwork that still has a hypothetically normal function (2-5). In literature, some papers have shown that GSL combined or not with phacoemulsification can obtain good results in eyes with CAGC, especially in those with less than six months of the PAS appearance (2-8). Canlis et al. (8) showed that ultrasound biomicroscopy (UBM) can be useful in evaluating pre and postoperative GSL. In Brazil, there is only one case report of GSL performed by one of the authors (SC) (11). It was carried out on a patient with PAS due to two episodes of acute primary angle-closure that did not respond to conventional clinical treatment. This case was included in this series.

The aim of this study is to evaluate the effectiveness and safety of GSL in patients with CAGC due to APAC.

METHODS

We retrospectively analyzed the charts of five patients with CAGC who underwent GSL at the Glaucoma Service of São Geraldo Hospital in the period from January, 2005 to February, 2011. This study was approved by the Research Ethics Committee of the Federal University of Minas Gerais.

We registered the demographics, cause of CAGC, visual acuity (VA), IOP, conventional gonioscopy with a Goldmann three-mirror lens, indentation gonioscopy with a Zeiss four-mirror goniolens and medication before and after GSL. We included only patients who had had one or more APAC episodes with a circumferential synchial angle-closure (PAS in 360° of the angle) for less than or up to six months and a minimum six month follow-up after GSL. Preoperatively, we performed ultrasound biomicroscopy (UBM) in all eyes. The GSL’s technique (Figure 1) was the same in all patients and performed by the same doctor (SC). It consisted of two paracentesis, one nasal and the other temporal, both performed with a # 15 scalpel. Afterwards, the anterior chamber was deepened more than its normal depth by the injection of 2% methylcellulose. The patient’s head was inclined to one side in order that the surface of the iris was parallel to the optical axis of the microscope. We used the Swan-Jacob gonioprism lens (Ocular Instruments Inc., Bellevue, WA) (Figure 2) in order to better visualize the synchial region and its extension such as it was done by other authors (8,13). We then introduced a delicate spatula pressing posteriorly its tip around 360° of the angle against the most peripheral iris adjacent to the point of angle adhesion until the trabecular meshwork was exposed. This maneuver was repeated along the circumference of the peripheral iris until the angle was opened. The methylcellulose was removed and replaced with a balanced saline solution. In two eyes, GSL was the only procedure and in three others having cataracts GSL was performed following corneal clear phacoemulsification with intraocular lens implantation at the same occasion. After GSL, we prescribed 0.1% prednisolone six times a day and 1% atropine three times a day, tapered within six weeks, and antibiotic drops four times a day for seven days. In cases with inflammatory reaction (plasmoid anterior chamber reaction), 40 mg of oral prednisolone were prescribed for five days. The IOP was measured on the first post operative day, at one, three and six months and at the last visit. In those eyes in which the post operative IOP was still elevated, the pre operative
antiglaucomatous medication was used. The complications during and after GSL were registered. We compared the pre and postoperative data.

**RESULTS**

We included five patients, four (80%) females and one (20%) male with ages ranging from 52 to 66 years old (61.2±5.0). Three (60%) patients were mulatto and two (40%) white.

The indentation gonioscopy exam revealed that synechial angle-closure was present before GSL in 360° of the angle in all eyes. Three (60%) patients developed PAS after one APAC episode and two (40%) patients after two APAC episodes. Preoperative UBM confirmed the synechial angle-closure in all eyes. In two (40%) eyes (patients 1 and 5) UBM revealed a small opening of the angle behind the synechial angle-closure region. The circumferential synechial angle-closure was due to APAC in all eyes (100%). All patients were taking 250 mg of oral acetazolamide three times daily plus three antiglaucomatous eye drops. The GSL was the only procedure in two (40%) eyes (Patients 2 and 3). In the other three (60%) eyes (patients 1, 4 and 5), GSL was performed at the same occasion, following phacoemulsification and intraocular lens implantation. Before GSL, the IOP had a minimum value of 34 mmHg and a maximum value of 58 mmHg with a median equal to 50 mmHg and a standard deviation equal to 9.96. After GSL and at the average follow-up of 32.4±15.6 months, the IOP had a minimum value of 8 mmHg and a maximum value of 44 mmHg with a median equal to 14 mmHg and a standard deviation equal to 14.1. Considering only the four eyes in which GSL was successful, the average preoperative IOP dropped from 45.5±10.6 to 13.3±3.8 mmHg post GSL.

At the last examination, conventional gonioscopy (Goldmann three-mirror lens) showed that the angle was circumferentially opened in four (80%) eyes. In one eye (patient 3), there was an angle re-closure. Three (60%) eyes no longer required antiglaucomatous medication and one (20%) needed to use one topical antiglaucomatous medication. In one eye (Patient 3), GSL was unsuccessful. This patient had had two APAC episodes before GSL. After GSL, despite the instillation of 1% atropine eye drops (three times a day), topical corticosteroid (six times a day) and antibiotic eye drops (four times a day), the angle showed a PAS re-closure. This patient remained using three antiglaucomatous eye drops and using 250 mg of oral acetazolamide three times daily and abandoned the treatment. The average number of antiglaucomatous eye drops per patient decreased from 3.0±0.0 before GSL to 0.8±1.3 after GSL.

**DISCUSSION**

The diagnosis of CAGC requires the complete ocular disease history and a careful workup which includes slit lamp examination, IOP measurement and indentation gonioscopy. The aim of treating CAGC is to eliminate the underlying pathophysiological
mechanism and consequently normalizing the IOP.

Goniosynechialysis is a surgical procedure designed to remove PAS in an attempt to restore the physiological drainage of aqueous humor in eyes with glaucoma refractory to medical treatment and/or conventional surgery. According to literature, GSL can obtain good results in about 80% of eyes in which PAS has been present for up to one year after acute glaucoma or after other types of refractory glaucoma. GSL is mainly indicated when PAS has at least 180° has been present for less or up to one year. It can be associated with other procedures such as trabeculotomy or phacoemulsification with or without intraocular lens implantation. In this paper, GSL was the only surgical procedure in two (40%) eyes. In them, GSL was successful in one (50%) eye but it was unsuccessful in the other eye (50%) in which the IOP was previously much elevated. In three (60%) eyes, GSL was associated with phacoemulsification and intraocular lens implantation as it was done by other authors. In association with phacoemulsification and intraocular lens implantation, the GSL success rate was 100%. Overall, the GSL success rate was 80%. This is in agreement with previously published literature. As phacoemulsification with intraocular lens implantation does not cause significant IOP reduction, it seems to be clear that the IOP control was due to the phacoemulsification and intraocular lens implantation was responsible for an extraordinary reduction, it seems to be clear that the IOP control was due to the phacoemulsification and intraocular lens implantation was responsible for an extraordinary reduction.

Goniosynechialysis is an effective and safe procedure for the treatment of chronic angle-closure glaucoma. The GSL success rate is increased when it is performed in association with phacoemulsification and intraocular lens implantation.

**References**