

Use of compressive suture in the prevention and management of perioperative complications of glaucoma surgery

Uso da sutura compressiva na prevenção e manejo das complicações peroperatórias da cirurgia antiglaucomatosa

Fernanda Spinassé Agostini¹, Fábio Petersen Saraiva¹, Ângelo Ferreira Passos¹, Rodrigo Carvalho Amador¹, Livia da Silva Conci¹

ABSTRACT

Purpose: To describe the use of compressive suture (CS) in the prevention and management of adverse events associated with glaucoma surgery. **Methods:** This was a descriptive, retrospective study based on information retrieved from the records of patients submitted to glaucoma surgery between 1999 and 2012 at a regional main public hospital and at a private ophthalmology clinic belonging to one of the authors. Only cases with adverse events treated with CS were eligible. **Results:** Compressive suture was successfully used to improve the closure of the anterior and/or lateral edge of the conjunctival flap, to limit the downward extension of filtering blebs, to prevent excessive filtration from the scleral flap edge in cases of difficult closure with conventional suture, and in patients submitted to trabeculotomy-trabeculectomy. **Conclusion:** Safe, low-cost and easy to perform, compressive suture is a useful tool for the prevention and management of adverse events associated with glaucoma surgery.

Key-words: Glaucoma/surgery; Trabeculectomy; Filtering surgery; Intraoperative complications; Suture techniques

RESUMO

Objetivo: Descrever o uso de sutura compressiva (SC) na prevenção e no manejo de complicações associadas à cirurgia antiglaucomatosa. **Métodos:** Trata-se de um estudo descritivo, retrospectivo, baseado em informações obtidas dos registros de pacientes submetidos à cirurgia de glaucoma entre 1999 e 2012 em um hospital público de referência regional e em uma clínica oftalmológica privada de um dos autores. Somente casos com eventos adversos tratados com SC foram selecionados. **Resultados:** A SC foi usada com sucesso para proporcionar melhor vedação nas bordas anterior e/ou lateral do retalho conjuntival, para limitar a extensão descendente das bolhas filtrantes, para evitar a filtração excessiva da borda do retalho escleral em casos de fechamento difícil pela sutura convencional, e em pacientes submetidos à trabeculotomia - trabeculectomia. **Conclusão:** Trata-se de um procedimento de fácil realização, seguro e de baixo custo, bastante útil na abordagem de intercorrências e complicações durante a cirurgia antiglaucomatosa.

Descritores: Glaucoma/cirurgia; Trabeculectomia; Cirurgia filtrante; Complicações intraoperatórias; Técnicas de sutura

¹ Specialized Medicine Department, Universidade Federal do Espírito Santo, Vitória, ES, Brazil.

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INTRODUCTION

Glaucoma, one of the main causes of blindness in the world, is still treated primarily by lowering of the intraocular pressure.⁽¹⁾ However, glaucoma surgery is delicate and subject to a number of perioperative complications compromising outcomes.⁽²⁻⁵⁾ The events may be managed in a number of ways, depending on surgical skill and experience.

Compressive suture (CS) has been used to treat a range of complications, such as hyperfiltering blebs, symptomatic blebs and external leakage,⁽⁶⁻¹⁶⁾ all of which are known to occur during or after glaucoma surgery. Nevertheless, to our knowledge no study has systematically evaluated the use of CS in this condition.

In this paper we describe the use of CS in the management of adverse events associated with glaucoma surgery, based on experience acquired at ophthalmology services in Southeastern Brazil. The study is intended as a subsidy for ophthalmologists looking to improve surgical outcomes.

METHODS

This was a descriptive, retrospective study based on information retrieved from the records of patients submitted to glaucoma surgery between 1999 and 2012 at Hospital das Clínicas (Universidade Federal do Espírito Santo/UFES) and at a private ophthalmology clinic belonging to one of the authors (AFP). Only cases with adverse events treated with CS were eligible.

The technique is shown in figure 1. Using mononylon thread size 9.0 or 10.0, the needle is passed through the cornea at half thickness, then through a fixed and firm tissue. All surgeries were performed by the authors (AFP and RCA).

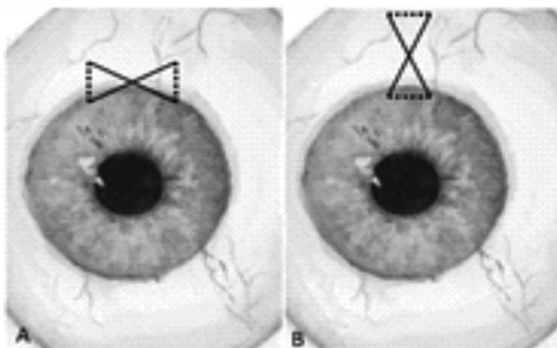


Figure 1: Two patterns of compressive suture.

RESULTS

Based on a study population of 139 patients treated with CS, 98 cases were identified in which CS was used to manage adverse events associated with glaucoma surgery.

Use of CS during trabeculectomy

A. to seal the anterior and/or lateral edges of the conjunctival flap

During trabeculectomy with fornix-based conjunctival flap, CS was used to prevent excessive leakage of aqueous humor from the flap, sealing either the anterior edge (n=22) or the lateral edge (n=20). The procedure was successful in all cases. Three examples are shown in figure 2.

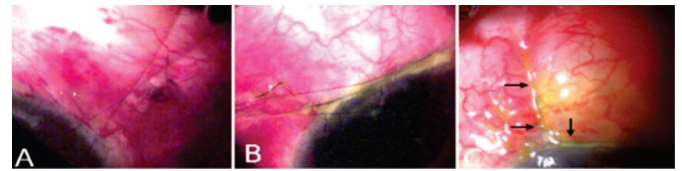


Figure 2: Compressive suture performed during trabeculectomy to prevent Seidel positivity. **A** – Suture used to close the lateral edge of the conjunctival flap (relaxing incision). **B** – closure of the anterior edge with two sutures and beginning of relaxing incision of conjunctival flap. **C** – closure of both the lateral and the anterior edge of the conjunctival flap (arrows). In all three cases, the formation of an elevated bleb is evidence of the great containing power of the sutures.

B. To prevent the downward extension of filtering blebs

In two eyes of two patients, the superior-nasal fistulas were located lower than desirable, with risk of development of symptomatic filtering blebs. In one of them (submitted to trabeculectomy) (Figure 3), the suture, despite being removed after only 15 days, produced an indelible groove which prevented the downward extension of the filtering bleb. In the other eye, CS was used in a needling procedure with the same purpose, producing an elevated bleb (Figure 4). The suture served its purpose and was removed 40 days later.

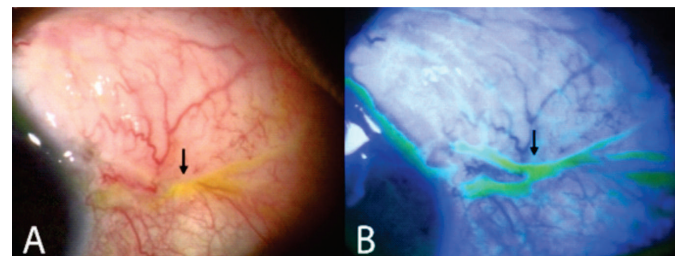


Figure 3. Three months after compressive suture used to prevent nasal extension of the filtering bleb. **A** and **B** – grooves created by compressive suture (arrows).

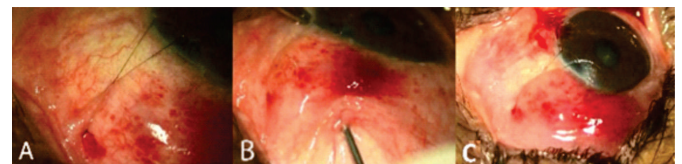


Figure 4: Compressive suture performed immediately before needling. **A** – after infiltration of mitomycin solution; **B** – during needling; **C** – bleb completely contained by the suture.

C. to prevent excessive filtration from the scleral flap edge in cases of difficult closure with conventional suture.

- In cases of laceration of the scleral flap during trabeculectomy - In two cases, CS was successfully used to prevent excessive leakage from the scleral flap.

- In infants submitted to trabeculectomy-trabeculectomy - At our service, CS is routinely used to treat infants. The great elasticity of the sclera almost always leads to scleral flap retraction, making closure difficult with conventional suture alone. CS was used in 45 cases of trabeculectomy-trabeculectomy for congenital glaucoma. To achieve closure enough to prevent excessive filtration, as a rule CS was performed with supporting stitches on each side of the scleral flap bed, near the edges, allowing for adequate closure with conventional suture (Figures 5 and 6).

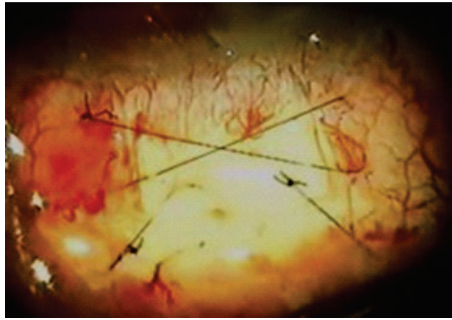


Figure 5: Compressive suture directly above the scleral flap used to shorten the distance between the edges of the flap bed.

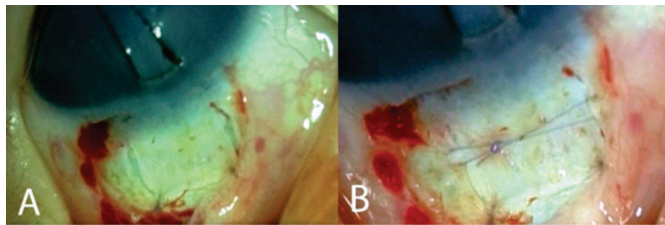


Figure 6: Congenital glaucoma. **A** - Thin and elastic sclera with wide opening between the flap edges and the bed; **B** - compressive suture with vicryl thread size 8.0 used to close the edges of the flap bed.

• In infants submitted to infratemporal trabeculotomy: CS was successfully performed in 7 eyes to facilitate hermetic closure of the scleral flap and minimize the risk of infection (Figure 7).

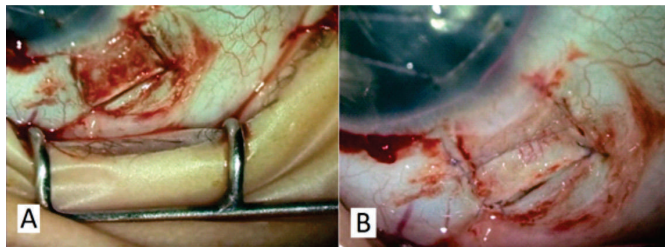


Figure 7: Compressive suture used to approximate the lateral edges, facilitating the hermetic closure of the scleral flap during trabeculotomy of the inferior-temporal quadrant.

DISCUSSION

CS is made with two widely separated supporting stitches. When tractioned, the suture exerts a compressive effect on the tissues between the stitches, potentially shortening the distance between them. Contrasting with other published descriptions of the technique,^(7,15) when CS is used to manage adverse events during glaucoma surgery, as in our experience, and especially when a prolonged effect is desired, the supporting stitches should be anchored in fixed and firm tissues, such as the cornea and the sclera (or at least the episclera), rather than in the conjunctiva and the fascia bulbi. When the supporting stitches are placed in the conjunctiva and the fascia bulbi, a conjunctival-bulbar fold is created and the compressive effect of the suture tends to be compromised. In fact, tension may decrease gradually as the tissues give in to the traction of the thread. Passing the needle through the episclera or sclera can be done by exposing the

episclera or by passing through the undissected conjunctiva and fascia bulbi. To minimize the risk of infection, a swab soaked in anesthetics and vasoconstrictor may be pressed against the conjunctiva for some seconds. This procedure increases the visibility of the episclera immediately before the passage of the needle and significantly increases topical anesthesia, making the surgery completely painless.

The suture pattern may be parallel or crossed over. The latter was used in almost all our cases and appears to be more efficient at creating localized compression. Also, the surgeon can make the threads cross over the site where compression is most needed.

During trabeculectomy, CS is an important tool to prevent leakage from the conjunctival flap edge, with practically 100% efficacy due to its excellent containing power, as long as it is anchored in a proper location and tensioned moderately. In addition, as demonstrated in two cases, during trabeculectomy and needling the sutures can often prevent filtering blebs from becoming symptomatic by limiting extension towards the horizontal meridian.

Moreover, during glaucoma surgery CS may be used to prevent excessive drainage from the flap. This was done in two cases of scleral flap laceration. It is also useful in infants with congenital glaucoma because great scleral elasticity and small scleral flap thickness increase the risk of flap retraction, making adequate closure with conventional sutures more difficult. If the purpose is only to reduce drainage, as in trabeculotomy-trabeculectomy, the thread should pass close to the scleral flap bed to allow greater approximation and, consequently, more appropriate flap closure. If the purpose is to completely prevent leakage from the scleral flap, greater compression on the flap may be achieved by passing the thread farther from the edges of the bed, thereby creating a larger arch of contact between the thread and the eyeball. As with CS on the conjunctiva, the occlusion of the fistula is facilitated if the suture passes over the site of ocular penetration.

In addition to the scenarios above, CS may be used to stabilize drainage devices implanted on the scleral patch, facilitating the use of conventional sutures and reducing the number of sutures needed. Even more importantly, paralimbal CS is used in implant surgery to prevent contact between the silicone tube and the cornea, as described by Allinson.⁽¹⁶⁾ In our experience, the most adequate position of a paralimbal suture is at the level of the tube's intrascleral trajectory towards the anterior chamber.

CS can have undesired effects and complications, such as temporary reduction of visual acuity due to astigmatism, especially when at least one of the supporting sutures is anchored in the cornea. This is particularly severe when hypotony persists after suturing as a result of the greater deformity of the eyeball. Knots in or near the cornea may have to be buried. The most frequently reported complications are endophthalmitis^(17,18) and bleb rupture,⁽¹⁵⁾ both of which may be induced by removal of the suture (which is therefore often left in place). Upon removal, the suture should be tractioned in the same direction it passed the bleb. Prophylaxis with antibiotic eye drops is recommended.

CONCLUSION

We described the use of CS in the prevention and management of perioperative adverse events associated with glaucoma surgery. The procedure was found to be efficient at eliminating external leakage, minimizing filtration from fistulas when used in combination with conventional sutures, and

preventing excessive downward extension of filtering blebs. CS is safe, low-cost and easy to perform.

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Corresponding Author:

Fernanda Spinassé Agostini

Departamento de Medicina Especializada/CCS/UFES. Av. Marechal Campos, 1468, Maruípe, Vitória, ES, Brazil.

Zipcode: 29047-105.

E-mail: fernandaspinasseagostini@gmail.com

Tel: (55)27 3335 7450