

Sealing the gap between conjunctiva and Tenon's capsule in primary pterygium surgery

Adição do selamento entre conjuntiva e cápsula de Tenon em cirurgia de pterígio primário

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ABSTRACT

Objective: To assess the results of an alternative surgical approach in the excision of primary pterygium by analyzing the rates of recurrence and of intraoperative and postoperative complications. **Methods:** Retrospective cross-sectional study based reviewing the clinical records of individuals subjected to surgery for pterygium, with conjunctival autograft transplantation, fibrin glue and intraoperative application of mitomycin C. In addition, sealing was performed by suturing the gap between the conjunctiva and Tenon's capsule. A total of 36 eyes from 35 individuals were subjected to the assessed techniques. The study variables were complications of surgery and recurrence rates during a minimum follow-up period of 6 months. **Results:** No recurrence occurred during the follow-up period. One graft (2.8%) exhibited partial retraction, but pterygium did not recur. The intraocular pressure increased in one eye (2.8%) and was controlled by clinical methods. **Conclusion:** Eyes in which a barrier was established between the conjunctiva and Tenon's capsule by sealing the gap between them showed an absence of recurrence in the sample studied. However, there is the need of a random prospective study with a control group for a more accurate conclusion on the efficacy of the technique.

Keywords: Pterygium/surgery; Autografts; Transplantation, autologous; Mitomycin/therapeutic use; Fibrin tissue adhesive; Recurrence

RESUMO

Objetivo: Avaliar os resultados de uma abordagem cirúrgica alternativa na excisão de pterígio primário por meio da observação das taxas de recidiva e de complicações intraoperatórias e pós-operatórias. **Métodos:** Estudo retrospectivo e transversal realizado a partir da revisão de prontuários de pacientes submetidos à cirurgia de pterígio com transplante autólogo de conjuntiva, cola de fibrina e aplicação intraoperatória de mitomicina C. Além disso, foi realizado através de sutura, o selamento da lacuna entre a conjuntiva e cápsula de Tenon. No total, 36 olhos de 35 pacientes foram submetidos à técnica. As variáveis do estudo foram complicações da cirurgia e taxas de recidiva durante um período mínimo de 6 meses de seguimento. **Resultados:** Não foram constatadas recidivas durante o tempo de seguimento. Um enxerto (2,8%) desenvolveu retração parcial, sem posterior recorrência do pterígio, e um olho (2,8%) apresentou aumento da pressão intraocular, que foi controlada clinicamente. **Conclusão:** A criação de uma barreira entre a conjuntiva e cápsula de Tenon, por meio do selamento da lacuna, mostrou ausência de recidiva na amostra estudada. Necessita-se, no entanto, de um estudo prospectivo randomizado com grupo controle para uma conclusão mais precisa da eficácia da técnica.

Descritores: Pterígio/cirurgia; Autoenxerto; Transplante autólogo; Mitomicina/uso terapêutico; Adesivo tecidual de fibrina; Recidiva

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INTRODUCTION

Pterygium, from the Greek, “pterygos”, small wing, is a triangle- or trapezoid-shaped fibrovascular growth of the conjunctiva, usually located in the nasal side of the sclera and extending towards the cornea ^(1,2). Its growth over time can cause visual and esthetic problems, impairing the quality of life of the patients and consequently requiring surgical removal.

Although it is a common eye problem, its standard surgical treatment has not yet been established. The high rates of postoperative recurrence, which exhibit remarkable variation among studies, are the main challenge patients and surgeons must address. Simple excision with bare sclera was widely performed in the past; however, the associated recurrence rates were unacceptable, as they could reach as high as 50% ⁽²⁾. In addition to other factors that influence the treatment outcomes, such as the pterygium morphological characteristics, some demographic variables and the postoperative regimen, surgical parameters not yet fully elucidated lead to divergent results ⁽³⁾.

In this regard, some authors observed that a gap is inevitably created between the conjunctiva and Tenon’s capsule after the excision of pterygium and Tenon’s resection, through which fibrovascular tissue remnants can pass to cause recurrence. By closing this gap during surgery, the recurrence rate achieved in one study was only 3.1% in all the groups, thus pointing to the potential utility of this technique ⁽³⁾. Therefore, the aim of this study was to assess the response to surgical treatment of primary pterygium including sealing of the gap between the conjunctiva and Tenon’s capsule, combined with conjunctival autograft transplantation using fibrin glue and the application of mitomycin C (MMC).

METHODS

The clinical records of individuals subjected to excision of primary pterygium using intraoperative MMC, non-pedunculated conjunctival autograft transplantation fixated with fibrin glue and the sealing of the gap by means of a suture between the conjunctiva and Tenon’s capsule, from february 2011 to august 2012, were retrospectively reviewed. The records were available at the database of BellotoStock Ophthalmology Center (Centro Oftalmológico BellotoStock), where the patients were assisted before and after surgery. During this period, this technique was applied to all of the patients who underwent pterygium surgery.

Only individuals who were followed up for at least six months after surgery were included in the study. Cases of recurrent pterygium and cases that did not complete the minimum follow up period were excluded from analysis. The total sample comprised 36 eyes from 35 individuals. The following data were collected before surgery: age, gender and pterygium localization.

The same surgeon (R.A.S.) performed all the surgical procedures at Santa Terezinha University Hospital (Hospital Universitário Santa Terezinha - HUST), Joaçaba (SC), Brazil, always using the same surgical and antiseptic techniques. The surgical technique was based on the one described by Liuet al. ⁽³⁾ The procedure started with peribulbar anesthesia using 2% lidocaine and 0.75% bupivacaine in 1:1 ratio. Asepsis was performed using 5% povidone-iodine followed by the placement of sterile surgical drapes and the eye speculum.

Using conjunctival scissors, the pterygium body and underlying Tenon’s capsule were dissected. The underlying Tenon’s capsule was minimally resected 1mm below the conjunctival edge, and cauterization was kept to a minimum. A

surgical sponge was soaked in 0.02% MMC (Ophthalmos, São Paulo, Brazil) and placed on the bare sclera for two minutes. The sponge was then removed, and the eye was copiously irrigated with a balanced salt solution (BSS – Alcon, Fort Worth, USA). Finally, the pterygium head was resected.

The gap invariably created between the conjunctiva and the underlying Tenon’s capsule following pterygium excision was first identified using two 0.12-mm forceps, one to grab the conjunctiva and the other to grab the Tenon’s capsule. The gap was then sealed by means of continuous suture with Vicryl 8.0 (Ethicon, Johnson & Johnson, São Paulo, Brazil) of both tissues, which blocked the emanation of fibrovascular tissue and restored the normal morphological features of the caruncle (Figure 1)⁽⁴⁾. The surgeon trained for the procedure by attending the course “Surgical Strategies for Recurrent Pterygium With or Without Motility Restriction” promoted by the American Academy of Ophthalmology (AAO) and taught by Scheffer C. G. Tseng MD PhD.

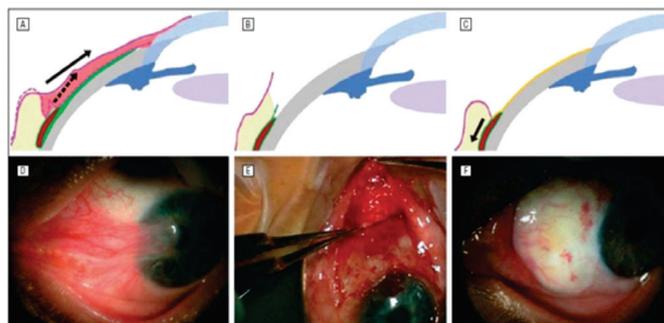


Figure 1: Concept of sealing of the gap; fibrovascular tissue sandwiched between the conjunctiva (pink) and the Tenon capsule (green) flattens the caruncle (A, solid arrow) and anteriorly displaces the semilunar fold (A, broken arrow), causing recurrent pterygium (D); this gap is invariably created when the pterygium head and body is removed (B); the gap is best demonstrated by two 0.12-mm forceps grabbing each tissue edge (E); when the gap is sealed, the dome-shaped caruncle is recreated by pulling the Tenon capsule when it naturally retracts posteriorly (C, arrow), and the surrounding conjunctival edge is also bent and rounded (F)
Source: Liu et al., JAMA, 2012.

The techniques to elaborate and fixate the conjunctival autograft were based on the techniques described by Kenyon et al. ⁽⁴⁾ and Koranyi et al. ⁽⁵⁾, respectively. The ipsilateral inferior conjunctival graft was marked horizontally and vertically and dissected without the Tenon’s capsule and with a margin of 2 mm larger than the excised conjunctiva measurements. The free conjunctival graft was then transplanted to the receiving bed while complying with the limbus to limbus origin. The graft was fixed to the receiving site using fibrin glue Evicel® (Omrx Biopharmaceuticals, Ramat Gan, Israel). First, one drop of fibrinogen solution was applied to the scleral bed; then, the graft was placed on the bed, and one drop of thrombin and calcium chloride solution was applied on top. The excess glue was removed, and the graft was trimmed wherever necessary. Finally, moxifloxacin (Vigamox®, Alcon, São Paulo, Brazil) was administered, followed by a single subconjunctival application of betamethasone (Celestone®, Mantecorp, São Paulo, Brazil). An dressing was applied, which was removed 24 hours later.

During the postoperative period, the following was prescribed: one drop of moxifloxacin eyedrops (Vigamox®, Alcon, São Paulo, Brazil) every four hours over 15 days; one drop of prednisolone acetate (PredFort®, Allergan, São Paulo,

Brazil) every two hours over 15 days, tapered along two months; and one drop of eye lubricant (Optive®, Allergan, São Paulo, Brazil) every three hours as needed.

The patients were assessed on days 1, 15, 30, 60, 120 and 180 and then every three months as to occurrence of relapse, which was defined as any growth of fibrovascular tissue that reached the corneal surface and extended beyond the limbus in the area corresponding to the excised pterygium. The Vicryl suture was removed two weeks after surgery with scissors under a slit lamp following the instillation of anesthetic eye drops. In the follow-up visits, the participants were subjected to slit lamp biomicroscopic examination, assessment of visual acuity and degree of conjunctival hyperemia and measurement of the intraocular pressure (IOP), and external photographs of all the eyes were acquired. To construct tables and graphics, the data were entered in a Microsoft Excel 2007 (Microsoft Corporation, Redmond, USA) spreadsheet. The study started after approval by the Research Ethics Committee of the University of West Santa Catarina on July 25 2012, ruling n° 66686.

RESULTS

The sample comprised 35 volunteers, 18 males (51.4%) and 17 females (48.6%). Twenty-one participants (60%) had pterygium in the right eye (RE), 13 (37.1%) in the left eye (LE) and one (2.9%) in both eyes. All the lesions were primary and located on the nasal side of the sclera (table 1).

Table 1

Demographic and clinical data of individuals with primary pterygium treated by gap sealing

Average age in years	44.37 (± 10.72)
Age in years (minimum and maximum)	29 – 71
Gender (n)	
Male	18 (51.4%)
Female	17 (48.6%)
Pterygium side (n)	
Right eye	21 (60%)
Left eye	14 (37.1%)
Both eyes	1 (2.9%)

The average age of the participants on the date of surgery was 44.37 years old, standard deviation (SD) ± 10.87 , varying from 29 to 74 years old. Fourteen participants (40%) were 20 to 39 years old, 17 (48.5%) were 40 to 59 years old, and four (11.5%) were 60 years old or older.

The duration of follow-up lasted 6 to 22 months, mean= 9 months, SD= ± 3.69 , and all of the patients completed the minimum follow-up period adopted. None of the 36 eyes exhibited pterygium recurrence during the follow-up period. No intraoperative complications occurred. One eye (2.8%) exhibited partial graft retraction, which did not require additional intervention and was not classified as recurrence due to later occurrence of conjunctivalization, which was complete by day 30 after surgery (figure 2). Another eye (2.8%) exhibited a moderate increase in the IOP, which was successfully handled by discontinuing the corticoid eye drops and introducing antiglaucoma eye drops. The esthetic results of the grafts were satisfactory, and the donor sites exhibited full recovery in all cases, while no instance of symblepharon, graft loss or excessive bleeding occurred during or after surgery (figure 3)

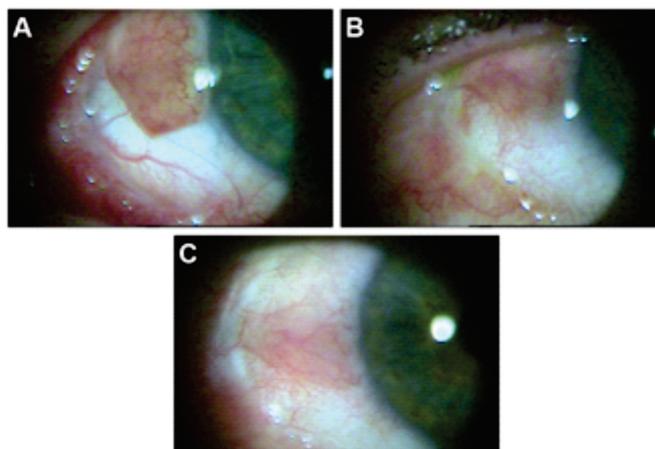


Figure 2: A) Clinical appearance of partial graft retraction two weeks after surgery; B) Appearance three months after surgery; C) Appearance six months after surgery

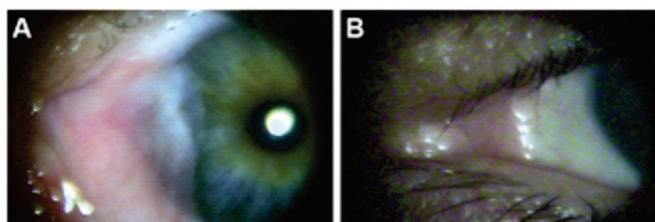


Figure 3: A) Clinical appearance before surgery; B) Clinical appearance six months after surgery

DISCUSSION

Although many attempts have been made at improving the surgical treatment of pterygium, there is not yet a consensus on the ideal technique, and the recurrence rates after surgical excision exhibit remarkable variation among studies. Recently, quite complex approaches have been developed to reduce such variation and the rates of recurrence. The technique selected in this study was the surgical excision of the pterygium, with minimal resection of Tenon's capsule combined with conjunctival autograft transplantation using fibrin glue and intraoperative application of MMC, which are usual techniques, in addition to an alternative procedure: the sealing of the gap between the conjunctiva and Tenon's capsule by means of suture. The proponents of this technique⁽³⁾ recommend the resection of Tenon's capsule to be minimal and its suture with the conjunctiva to be continuous.

The aim of surgical sealing is to hinder the propagation of residues of the fibrovascular tissue across the gap created between the conjunctiva and Tenon's capsule after the pterygium excision, thus preventing its recurrence⁽³⁾. Although the study that first demonstrated the efficacy of this procedure was conducted with individuals exhibiting multiple pterygium recurrence, the authors suggested the possibility of applying it to the treatment of primary pterygium⁽³⁾. That comment motivated the performance of this study, which included a sample exclusively composed of individuals with primary pterygium. The sealing of the gap by continuous sutures was successful in all the treated eyes, and the continuous sutures proved to be effective to restore a normal caruncle compared to the use of anchored sutures or anchored sutures combined with fibrin glue⁽³⁾. The procedure was brief, and the gaps were easily identified in all cases.

In contrast to other authors⁽³⁾ who used cryopreserved amniotic membrane grafts, conjunctival autografts were preferred in this study. This choice was based on the results of a randomized study⁽⁶⁾ and an official AAO report⁽⁷⁾ describing significantly lower recurrence rates in the cases in which conjunctival autografts were used versus amniotic membrane grafts.

One further peculiarity of the conjunctival grafts in the present study was the donor site. As a rule, grafts are taken from the ipsilateral upper conjunctiva; however, in this study, they were taken from the ipsilateral inferior conjunctiva to preserve the upper conjunctiva in case the patients might require antiglaucoma surgery in the future. In addition, one study failed to find a significant difference in the recurrence rates when the upper or inferior conjunctival quadrants were used as donor sites for primary pterygium surgery⁽⁸⁾.

In this study, conjunctival autograft transplantation and the intraoperative application of MMC as an adjuvant treatment were added to gap sealing. The combination of those two procedures for the treatment of primary pterygium, involving fixation of the conjunctival graft to the sclera by means of suture, has been successfully employed in comparative studies^(9,10). With regard to recurrent pterygium, two recent studies reported excellent results using a modification of that technique, which consisted of fixing the conjunctival graft with fibrin glue instead of sutures^(11,12). The use of fibrin glue helps to reduce the rate of recurrence, postoperative discomfort and the duration of surgery. For those reasons, it was used in this study^(5,13). Those results are lent further support by an official report published by the AAO, according to which the combination of conjunctival autograft transplantation and MMC results in lower rates of recurrence following the excision of pterygium, compared to each procedure alone⁽⁷⁾. In addition, the combination of the two procedures allows reduction of the dose and the intraoperative exposure of MMC, which makes the technique safer⁽¹⁴⁾.

Using these technical improvement (i.e., gap sealing, conjunctival autograft transplantation fixated with fibrin glue and intraoperative MMC), the recurrence rate was ideal, i.e., 0%, during the follow-up period. Among the studies that applied a similar technique, only one achieved 0% recurrence⁽¹⁰⁾, while the other studies reported low recurrence rates, to wit, 2%⁽⁹⁾, 3.5%⁽¹¹⁾ and 9.2%⁽¹⁴⁾. In one study that performed conjunctival autograft transplantation only with fibrin glue, but did not include gap sealing, the recurrence rate was higher, at 11.3%⁽¹⁵⁾. In the study most similar to this one, which also performed gap sealing in all the treated eyes, the adjusted recurrence rate was 3.1% in all the groups⁽³⁾.

The average duration of follow-up after surgery was 9 months; a period of 6 months is considered sufficient to detect 50% to 86% of the instances of relapse⁽¹⁶⁾, while 93% of such cases are detected when follow-up is extended to 9 months⁽¹⁷⁾.

Moderate inflammation might occur during the first two weeks after surgery due to the presence of the Vicryl suture, which fully disappears following its removal. For that reason, topical corticoids should be used more intensively during that period, and the dose should be reduced after suture removal. No intraoperative complications occurred in this series. In one eye (2.8%), the graft exhibited partial retraction during the first days after surgery, but no intervention was required, and pterygium did not recur. The retraction was possibly due to excessive Tenon's capsule remnants identified on slit lamp examination. That complication also occurred in one of the 28 eyes treated in another study⁽¹¹⁾. One eye (2.8%) exhibited a moderate increase in IOP, which was attributed to the topical corticoid used after surgery. That condition was fully controlled following discontinuance of the corticoid eye drops and the institution of clinical treatment.

CONCLUSION

The pterygium recurrence rate was 0% in the studied sample, and the two post-operative complications receded spontaneously or with the aid of a clinical treatment. Although the result was promising, a prospective randomized trial comparing groups treated with and without sealing of the gap between the conjunctiva and Tenon's capsule is needed to establish more precise conclusions regarding the efficacy of that technique in the treatment of primary pterygium.

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