Evaluation of topical vasoconstrictors in pterygium surgery and their role in reducing intraoperative bleeding

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Abstract

Objective: To reduce vascularisation before surgery through the application of topical vasoconstrictors, decreases the rate of intraoperative bleeding, improves the dynamics of the surgery and reduces the difficulty in surgical performance.

Methods: Only patients with primary pterygium were included in the study. A prospective randomized clinical trial was designed to compare intraoperative bleeding, need for cautery and surgical time a group that was administered phenylephrine preoperatively and one which did not receive it. The sample was divided into two groups: 1st (n=27) received topical phenylephrine (F) 0.1ml (10%), twice in 5 minutes before surgery. 2nd (n=30) did not receive phenylephrine (NoF). The technique was similar in both groups using conjunctival autograft suturing. In both groups, the subconjunctival anaesthesia was performed with 0.5% bupivacaine hydrochloride with epinephrine 1:200,000.

Results: A total of 57 patients were included in the study. The mean operation time for group F was 15.57 minutes (SD: 1.8 min) and the NoF group 16.51 min (SD to 1.82 min, P=.057). In the group F, it was necessary to use diathermy in 2 patients (7.4%) and in the NoF group cautery was used in 14 patients (46.7%, Chi-Square=10.848, P=.001. There is a relative risk 6.3 (95% CI 1.57 - 25.27) times greater than having to cauterize without phenylephrine when used phenylephrine.

Conclusions: The use of topical vasoconstrictors prior to pterygium surgery reduces the rate of bleeding and the time of surgery.
Introduction

Recent etiological theories affirm that pterygium is not only a degenerative disease but also a proliferative inflammation. Surgical extirpation is the treatment of choice. The literature suggests that simple excision leaving the sclera free is the only technique with high recurrence rates of between 30% and 70%. Autogenous conjunctival graft seems to be the best surgical method as it exhibits a low recurrence rate in addition to less secondary effects.

It has recently been demonstrated that the Hispanic race is a risk factor for increased pterygium recurrence rates, even if the technique is utilized after the primary excision and conjunctival autograft (CAG). The contribution of UV radiation to the pathogenesis of pterygium has been supported by epidemiologic data on ocular solar exposure. In addition, immunohistochemical studies demonstrate the mutations of protein p53 due to the damages caused by UV radiation. This damage induces the production of cytokines, growth factors and metaloproteinases of the metrics responsible for the growth of pterygium.

Existing references demonstrate the difficulties due to intra-op hemorrhage, occasionally requiring the use of monopolar coagulation or suspending the intervention due to excessive bleeding. This gives rise to numerous interruptions and increased surgery times.

Our hypotheses is that the reduction of previous and intra-op vascularization through the prior application of vasoconstrictors before surgery diminishes the rate of intraoperative bleeding, improves the surgery dynamics and reduces the difficulty of the surgical procedure.

Subjects, material and methods

A prospective randomized clinical trial was designed to compare intraoperative bleeding and cauteration requirements and surgery times between a group which was administered phenylephrine before the operation and a group which was not. An informed consent was requested from each patient and the study was carried out between September 2009 and February 2010.

Selection of patients and methods

We selected a group of patients (n=57) with an inclusion criteria of pterygium diagnostic. Only the patients with primary pterygium were included in the study. The patients who underwent previous filtration surgery, corneal transplant or had a history of ocular trauma and exposure to chemical products were excluded from the study group. The sample was divided into groups: the first group (n=27) received topical phenylephrine 0.1ml (10%) on 2 occasions 5 minutes before the surgery; the second group (n=30) did not.

Results: A total of 57 patients were included in the study. The media of the primary group (F) was 15,57 minutes (SD: 1,8 min) and for the group of NoF of 16,51 min (SD: 1,82 min; p = 0,057). In the group F, was necessary use the diatermia in 2 patients (7,4%), in the NoF se usó la cautización en 14 pacientes (46,7%; Chi-cuadrado = 10,848; p = 0,001. Existe un riesgo relativo 6,3 (IC 95%: 1,57 a 25,27) veces mayor de tener que cauternar sin fenilefrina que cuando se usa fenilefrina.

Conclusions: El uso de vasoconstrictores tópicos previos a la cirugía de pterigión disminuye la tasa de sangrado y reduce el tiempo de cirugía.

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for the only surgeon who carried out all the surgeries in order to avoid a bias, and in addition it was randomized. The surgical technique was similar in both groups, with conjunctival autograft and stitch described by Harvey et al (2005)\(^1\). According to the description of this author, the need to utilize diathermia was established for intra-op bleeding. In both groups, subconjunctival anesthesia was performed with a combination of anesthesia and vasoconstrictor: 0.5% bupivacaine chlorhydrate with epinephrine in 1:200.000.

**Evaluation and follow-up**

After the operation, the subjects of both groups were treated with tobramycine and dexamethasone eyedrops four times a day, with a gradually diminishing prescription through a four-week period. All the subjects were assessed 24 hours after the surgery and one week, one month and 3 months after the intervention. In each postop visit a slit lamp biomicroscopy and applanation tonometry was performed.

**Statistical analysis**

A descriptive statistical analysis was performed, followed by an analysis of the comparability of both groups according to age and sex. To verify the existence of differences between both groups the adjustment of the quantitative variables to normal distribution was previously verified through the Shapiro-Wilk or Kolmogorov-Smirnov tests. As these variables followed a normal distribution, the T for Student test for independent samples was applied. For comparing qualitative variables the Chi Square test was utilized, assuming a value of \(p<0.05\) (bilateral tests). The statistical calculations were made with the SPSS application, version 17.0 (SPSS Inc, Chicago).

**Results**

In all, 57 patients were studied, of whom 47 (82.5%) were male and 10 female (17.5%), without appreciating differences between both groups (\(p=0.85\)). The group which was administered preop phenylephrine (F) had a mean age of 50.59 years (SD: 12.11) and the group which was not administered preop phenylephrine (NoF) had a mean age of 54.03 years (SD:12.31; \(p=0.29\)). Of all the eyes, 32 were right eyes and 25 left eyes (table 1).

![Table 1](image)

In group F it was necessary to apply diathermia in 2 patients (7.4%) and in group NoF cauterization had to be applied in 14 patients (46.7%; Chi-square =10.848; \(p=0.001\). Therefore, there is a relative risk of 6.3 (CI 95%: 1.57 to 25.27) times greater having to cauterize without phenylephrine than with phenylephrine. Two patients (7.4%) of group F exhibited pterygium relapse against 20.0% (n=6) of the NoF group, when preop phenylephrine was not applied (\(p=0.172\)) (table 1).

**Discussion**

Many attempts have been made to optimize pterygium surgery. At present a large variety of techniques are utilized, ranging from the free sclera procedure without utilizing microscope up to the amniotic membrane transplant and conjunctival autograft or lamellar keratoplasty.\(^1\)

However, all of the above methods report complications, ranging from scleromalatia to some involving loss of eyesight.\(^13\) Depending on the techniques applied, we found in the references that the main intra-op complication was bleeding.\(^8\)-\(^1\),\(^1\)\(^6\) This can cause various complications during operations such as increasing the difficulty of removing the graft, requiring the use of diathermia for coagulating the bleeding focus or causing graft dehiscence due to accumulation of blood.

In our study it has been demonstrated that reducing preop vascularization with topical vasoconstrictors significantly reduces the rate of intraoperative coagulation with diathermia due to bleeding. This achieves greater surgical control and less interruptions in the chosen technique.

In addition, although the differences as regards surgery time are not significant, the mean surgical time for group F is nearly one minute less (15.57 minutes) than for group NoF (16.51 minutes). It can be seen that the \(p\) value is nearly significant, as it is close to 0.057. In our criteria, this suggests that future clinical trials with a larger sample would consistently evidence that the use of topical vasoconstrictor agents prior to surgery could not only diminish the rate of intraoperative bleeding but also significantly improve surgery times.

Accordingly, and in the light of the data of this study, it is proposed to develop a new topical vasoconstrictors specific for conjunctival vascularization as well as possible combinations thereof for reducing intraoperative bleeding.

**Conflict of interest**

None of the authors have declared any conflict of interest.
References