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Preoperative factors influencing success in pterygium surgery

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Abstract
Purpose-*To identify preoperative, perioperative and postoperative risk factors that influence the success of pterygium surgery..*
Materials and Methods *This is a prospective study of fifty patients with primary or recurrent pterygia. A detailed anamnesis and an ophthalmological examination were performed looking for the following factors: age, race, latitude and altitude of the main place of residence, hours of exposure to the sun, use of protective measures against UV-radiation, classification of pterygium, width of the pterygium at limbus, surgical technique (conjunctival autograft plus suturing versus tissue glue), graft alterations (misapposition, granuloma, haemorrhage, oedema, retraction or necrosis), and postoperative symptoms (foreign-body sensation, pain). The examinations were performed 2 and 7 days and 2, 6 and 12 months after surgery. In addition, recurrence was defined as any growth of conjunctiva into the cornea.Result-total number of 36 patients completed a one year follow-up.. The hours of sun exposure through their life was independently related to surgical success. Pterygia of less than 5 mm of base width showed a weak positive correlation with recurrence. None of the other factors considered were significantly related to recurrence*
C***onclusion****Male gender and high sun exposure are strongly and independently related to surgical success after the removal of pterygia.*
Keywords-risk factors,sunlight exposure ,pterygiumsurgery,conjunctival autograft

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I. Introduction

Pterygium is a wing-shaped, fibrovascular tissue crossing the limbus into the cornea. It is a common ocular surface disease, but also potentially blinding, so different surgical procedures have been used to prevent it. Recurrence after excision remains a great challenge. Nowadays, it is accepted that conjunctival autograft surgery is the procedure of choice for the treatment of both primary and recurrent pterygium [1, 2].

The pathogenesis of pterygia is still not completely understood. An overall view of the growth process reveals a multiplicity of factors that are correlated and interrelated [3]. Recent evidence implicates anti-apoptotic mechanisms, immunological mechanisms, cytokines, growth factors, extracellular matrix modulators, genetic factors and viral infections, among other possible causative factors [4, 5].

The prevalence rates vary widely (from 2% to 29%) [1], but generally they are higher in the tropics than at temperate latitudes [6, 7]. It is accepted that pterygium occurs in an equatorial belt delimited by Latitude 40N and S, associating it with ultra-violet light [7–9]. Prevalence increases geographically towards the equator and is greater in people exposed to outdoor environments [10]. In addition, there are associations with rural regions, increasing age and male gender, which correlate with outdoor work [11]. Although a lot has been written about the risk factors for developing a pterygium, the relationship between them and the outcome of the surgery is still unclear.

The purpose of our study is to identify preoperative, perioperative and postoperative risk factors that influence the success of pterygium surgery.

II. Method and Material

Subjects:

A prospective analysis was performed on 50 patients with primary and recurrent pterygia of maharani laxmibai medical college,jhansi from october 2019 to march 2020.The patient-related data collected in this study include the following: name, age, and clinical diagnosis. The names were replaced by numbers, and the relevant data of the patient was encrypted and stored in the main study. We had obtained the written informed consent of the parents of the children.

Methods

This is a prospective study, involving fifty patients with primary or recurrent pterygia, treated at maharani laxmibai medical college . A comprehensive medical and ocular history was obtained by a single ophthalmologist (the coauthor AT). The patient´s age , gender and race (Caucasian or Hispanic) were recorded. Then a detailed questionnaire was undertaken in order to evaluate: principal place of residence (the name of the place where he/she lived most of his/her life), exposure to sun over lifetime (hours per day, during workdays and rest days), use of sun protection (none, hat, sunglasses, both of them) and the use of prescription glasses. We looked for the latitude and altitude of the patient´s principal place of residence . Furthermore, Snellen visual acuity measurement, applanation tonometry, slit-lamp examination, funduscopy and anterior segment photography were performed pre-operatively. A pterygium was defined as a radially oriented fibrovascular lesion crossing the nasal or temporal limbus. Moreover, the pterygia were graded according to the system used by [12]: grade 1 (atrophic: episcleral vessels under the body of the pterygium are not obscured and clearly distinguished), grade 3 (fleshy: episcleral vessels totally obscured) and grade 2 (intermediate: all other pterygia not falling into these 2 grades). We also estimated the width of the pterygia at limbus, dividing them into two groups: wide base (≥ 5mm) and narrow base (<5 mm). The pterygia sizes were measured with a slit lamp by using a slit beam of light. Tear break-up time measurement, evaluation of ocular motility, presence of symblepharon and previous surgery were also indicated.

Surgical technique

The surgical technique used is similar to procedures described earlier. [2, 13] Patients were randomized into 2 subgroups: Tissue glue group (TG) and Mersilk group (MG). Tissue glue was used to attach the auto graft in 21 patients and 7.0 Mersilk sutures were used in 18 cases.

Tissucol Duo® (Baxter AG, Vienna, Austria) is a fibrin solution that simulates the final stage of the coagulation cascade. The kit includes 2 syringes, one containing a solution comprised of factor XIII, plasminogen, plasma fibronectin and fibrinogen and a second syringe that contains a human thrombin solution. All patients were operated on by the same surgeon (LM). The procedure was carried out under topical and subconjunctival (lidocaine 2%) anaesthetic. Pterygium dissection from the head towards the body was made. Then the pterygium head, along with the underlying tenon tissue, was excised. Episcleral scarring was removed and minimal cauterisation was used to control bleeding in the recipient bed. The area of the conjunctival defect was measured with a caliper, and a free conjunctival-limbal auto graft measuring the same size as the conjunctival defect was obtained from the superotemporal quadrant of the bulbar conjunctiva. For the graft dissection, 2% lidocaine was injected under the conjunctiva in order that only conjunctiva be obtained. The conjunctiva was dissected from the fornix to the limbus, and graft dissection was extended by 0.5 mm into the clear cornea to include the limbal element of the graft. Meticulous dissection was performed in order to remove the Tenon capsule as much as possible. In the suture group, the limbal part of the graft was attached to the adjacent conjunctiva and episclera with 2 interrupted 7-0 Mersilk sutures. In the tissue glue group, one drop of thrombin solution was applied over the bare sclera in the recipient bed and one drop of protein concentrate solution was applied over the stromal side of the graft. The graft was immediately placed in the correct orientation onto the bare. Postoperative therapy included Tobramycin-Dexametasone combination every six hours, Pranoprofen eyedrops every six hours for four weeks and a Povidone artificial tear every six hours for two months. The postoperative follow-up was carried out by a single ophthalmologist (AT). The examinations were performed between 2 and 7 days and between 2, 6 and 12 months after surgery. The anterior segment and the integrity of the autograft (granuloma formation, subconjunctival haemorrhage, edema, necrosis, retraction and gaping or displacement of the graft-bed junction) were evaluated by slit lamp biomicroscopic examination at each visit. Silk sutures were removed at the one week visit. Recurrence was defined as any growth of the conjunctiva into the cornea. All patients were asked about subjective symptoms and graded into 4 groups: asymptomatic, foreign-body sensation, mild pain or severe pain (defined by the need for an oral analgesic). At the 2-month visit, visual acuity was also checked and an anterior segment photograph was taken at the 12-month visit. Reoperation was performed with the patient´s consent if recurrent pterygium was observed on a ny follow-up examination, which happened in just two cases. The remaining patients that recurred were free of symptoms and preferred to wait and see evolution.

Inclusion Criteria: **Patients were included if they presented a primary or recurrent pterygia, for which surgery was recommended considering the following critreria. (i) A visual disturbance either through pupillary aperture invasion or by significantly inducing corneal astigmatism (more than 2 diopters measured by corneal topography and not attributable to other causes). (ii) Documented enlargement over time in the direction of the centre of the cornea. (iii) Chronic symptomatic inflammation (significant foreign-body sensation or pain, hyperemia, dellen, corneal epithelial defect)**

Exclusion criteria:Subjects with other pathology features or infection of the ocular surface that might alter wound healing, mainly connective tissue disease and diabetes were excluded. All patients gave

written informed consent to participating in the study

Statistical Analysis

Statistical analysis has been performed using the statistical software environment R [14]. Logistic regression (the function glm included in [15]) and survival analysis has been used. The interval censored data has been analyzed using [16]. Variable selection has been applied. The method used consists of the minimization of the AIC (Akaike information criterium). It has been performed using the function stepAIC included in the R package MASS [15]. The interval censored data has been analyzed using the R package interval [16].

III. Result

Our major aim will be to study the influence of some covariables over the one year recurrence. The covariables considered are: age (AGE), gender (GENDER: 1, male; 0, female), race (R, Caucasians and Hispanics), latitude (LAT), altitude (ALT), workdays sun exposure (WDE), non-workdays sun exposure (NWDE), primary vs recurrent pterygia (PR), pterygium type (PT: 1, 2 and 3 according to Tan classification), wide base (WB: less or greater than 5 mm), surgical technique (ST: fibrin glue and sutures), miss-apposition (MA: 0, not and 1, yes) and protective measures (PM: 0, none; 1, hat; 2, sunglass A total of fifty patients completed the 12-month follow-up period and eight of them (22%) presented a recurrence within a year post-operatively. The most important variable influencing surgical success is gender. All patients that suffered a recurrence were male. The second most important variable is the hours that the subject was exposed to sun radiation, mainly during workdays, but also on non-workdays. Patients that recurred were younger than those who did not recur (but not statistically significant).

sex	No.of patient	percentage
male	30	60%
female	20	40%

	Nonrecurrence	recurrence	Percentage of recurrence
Male	20	10	33.33%
Female	18	02	10%
Wide base <5mm	25	5	10%
Wide base >5mm	17	3	6%
Primary	25	5	15%
Recurrent	15	5	25%
Glue	20	10	33.33%
Suture	17	03	15%

IV. Discussion

Pterygia is more common in male than in women.the female gender has been reported as a marker for lower occupational or recreational exposure to sunlight. However, greater exposure to the sun alone cannot explain the male preponderance to developing pterigia. It is suggested that other unknown factors probably play a role [18, 20]. In a paper comparing the outcomes of pterygium surgery, males and patients under 40 years of age face a greater risk of recurrence [21]. Our results indicate that the male gender is also strongly and independently associated with pterigia recurrence after surgery. Surprisingly, a younger age does not mean a greater risk of recurrence in our cases.

Epidemiological factors influencing pterygium develop- ment have been suggested (chronic sun exposure, peri-equatorial place of residence, high altitude or dry weather) [7, 17, 18, 22, 23]. Prevalence increases geographically towards the equator and sun exposure has been reported as one of the most important factors influencing pterigyum development [10, 17, 24–28]. Therefore, keeping the eyes out of direct sunlight has been defended as beneficial. Measures such as wearing sunglasses or prescription glasses, have been described as protective factors against pterygium development [7, 24, 26, 29].

We have not found a significant relationship between ethnicity, latitude and altitude of the main place of residence and surgical recurrence. Protective measures against sun radiation, such as wearing sunglasses, refractive glasses or a hat do not affect the recurrence ratio in our sample either . We believe that this is a factor which is difficult to evaluate over an individual´s life . However, sun exposure has been the second most important factor influencing recurrence. Strong epidemiological evidence links exposure to ultraviolet and visible light with the development of pterygium. It has been proposed that the focal limbal irradiation of basal epithelial cells results in the alteration of these cells and a breakdown of the limbal barrier [30]. Our results indicate that focal limbal insufficiency due to high sun exposure for years also determines a higher probability of recurrence after conjunctival grafting.

In our study, narrow base pterygia (less than 5 mm at the limbus) showed a weak association with recurrence. This factor is not usually considered in pterygia studies. Larger prospective studies should be undertaken to confirm this. Conjunctival autografting is often utilized with low recurrence and good success in both primary and recurrent pterygia. Some surgeons perform grafting as their standard procedure for the treatment of both primary and recurrent pterygium. This is due to a low recurrence rate, efficient limbal reconstruction and long-term safety compared with other techniques such as mitomycine application and beta radiation [1, 2, 31]. Some authors use a temporal amniotic membrane patch covering the excised area with low recurrence ratio [13]. The auto graft can be fixed with sutures or fibrin glue. The use of a tissue adhesive simplifies the surgical technique and minimizes postoperative inflammation, reducing both operating time and postoperative pain [32]. What is more, it provides an excellent hemostasis even in congested eyes with recurrent pterygium [33]. The recurrence rates when using this surgical technique, vary from 2% to 34%, depending on individual technique and surgical experience [1–12]. In addition, we believe that the follow-up period must be at least one year after surgery in order to detect all recurrences. When comparing sutures to fibrin glue, most of the studies show a low recurrence rate when the graft is attached with glue ([1, 2, 34–36]), or at least similar rates with both procedures. 37-39 Besides, the glued-graft also reduces surgery time and improves postoperative patient comfort [1, 34–39]. We have not found any difference in the recurrence ratio between both procedures. (granuloma, edema, haemorrhage, retraction, misapposition or necrosis),they showed no relationshipwith recurrence ratio either.

V. Conclusion

Epidemiological and clinical aspects influencing pterygia development have been extensively studied, but few works consider those factors related to surgery failure. Our results indicate that male gender and sun exposure are strongly and independently related to surgical success after pterygia removal. We believe that sun exposure over life and male gender should be considered as additional risk factors for recurrence after pterygium autograft. Extremely meticulous surgery and close follow up must be employed when operating these patients. We are aware about the small sample sizes. We have a small number of patients evaluated. Clearly, this is a limitation of our paper and consequently we have a small statistical power. Larger studies should be carrier out in order to confirm our results.

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