Outcome of Excision of Primary Pterygium with Bare Sclera Technique: A Study of 80 Eyes in Malaysia

Subash Govindasamy and Sagili Chandrasekhara Reddy

ABSTRACT

In this retrospective study of 166 patients with pterygium, it was more predominant in males (66.9%) and in 31–40 years age group (69.9%). Irritation was the most common symptom (29.5%), while 13.8% were asymptomatic. Seventy four patients (44.6%) were armed forces personnel and the rest were civilian patients in this study. A total of 248 pterygia (146 mild, 94 moderate and 8 advanced) were noted in this study. Standard procedure of excision of the growth with bare sclera technique was performed in 80 eyes wherever indicated (nasal or temporal in 66 eyes, both nasal and temporal in 7 eyes). During the follow up period two complications (granuloma of conjunctiva and recurrence of pterygium) were noted. Small (5 mm size) granuloma occurred during the early postoperative period in 10 out of 80 eyes (12.5%), which healed completely with medical treatment without any need of surgical intervention. The recurrence of pterygium occurred in 19 out of 80 eyes (23.7%). The mean duration of recurrence was 5.5 months with a range varying from 2 to 12 months period. Recurrence of pterygium was observed to be higher in armed forces personnel (11 out of 19 eyes, (57.9%)) than in civilian patients (8 out of 19 eyes, 42.1%). There was early recurrence of pterygium in armed forces personnel (mean duration 5.1 months) than in civilian patients (mean duration 6.6 months). The modified technique of this with addition of intraoperative conjunctival autograft to reduce the recurrence rate of pterygium is in progress.

Keywords: Bare sclera technique, conjunctival autograft, pterygium excision, recurrence of pterygium.

I. INTRODUCTION

The term pterygium comes from the ancient Greek πτερυξ (pteryx) = wing and πτερυγιον (pterygion) = fin. Pterygium is characterized by a triangular portion of the bulbar conjunctiva encroaching onto the cornea, usually within the infrapalpebral fissure and most often from the nasal side [1]. Symptoms associated with pterygium development include chronic ocular surface inflammation and tearing, eventually astigmatism and blurred vision attributable to optical axis involvement. The natural history of the condition is variable, prolonged static periods do exist. However, progressive growth characterizes the majority of cases of pterygia, especially those affecting younger individuals, often necessitating surgical removal.

Primary pterygium is a triangular/wing shaped growth of conjunctiva, characterized by elastic degeneration of collagen and fibrovascular proliferation, which occurs in the interpalpebral area on the nasal or temporal side with its apex towards the limbus. If not treated pterygium may progressively grow in size to occlude the optical axis in advanced cases resulting in diminution of vision. The recurrence of pterygium is defined as the conjunctival growth in the area of previous operation and extending on to the cornea.

The prevalence of pterygium was found to be 10.2% in the world, with highest prevalence in low altitude regions. Increased incidence of pterygium is noted in the tropics and in an equatorial zone between 30° north and south latitudes. Higher incidence is associated with chronic sun exposure (ultraviolet light), older age, male sex, and outdoor activity [2].

Although the exact aetiology of pterygium is unknown, there seems to be an association between outdoor work and pterygium formation [3], especially with ultraviolet radiation. The pterygium is a growth disorder characterized by conjunctivalisation of the cornea due to localized ultraviolet induced damage to the limbal stem cells [4]. Aggressive pterygial fibroblasts have been reported to be responsible for corneal invasiveness [5]. The medical treatment includes decongestant drops (naphthazoline) and artificial tears (carboxymethyl cellulose) for relief of symptoms. The indications for surgery include visually significant induced astigmatism, threat of involvement of the visual axis, cosmetically significant pterygium, severe symptoms of irritation, and restriction of extraocular movements [6].

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The literature search (Pubmed, Science direct, and Google search) revealed only one published report from Malaysia [7]. Therefore, this study was undertaken with an objective of determining the outcome of excision of primary pterygium with bare sclera technique which is the most common and standard surgical procedure performed.

II. MATERIAL AND METHODS

All the medical records of the patients with pterygium who were operated in Armed Forces Hospital, Lumut, over a period of three years were reviewed. Age, gender, race, armed forces/civilian personnel, presenting symptoms, eye involved, side/location of pterygium, extent of pterygium on the cornea, type of surgery done, post-operative complications, post-operative follow up period and any recurrence of pterygium were noted from the records.

Inclusion criteria: Patients with typical growth of pterygium on either side of the limbus without any other conjunctival or corneal pathology seen in Lumut hospital, and cases of civil patients with similar inclusion criteria who were operated in Lumut hospital and seen in the nearby district civil hospital during follow up were included in this study.

Exclusion criteria: Patients with history of pterygium operation earlier and presented with growth again (recurrent pterygium -16 cases) were not included in this study. This study adhered to the tenets of the Declaration of Helsinki and approved by the institution’s ethics committee. Informed consent was obtained from all the participants in this study.

Pterygium was graded as mild (growth extending up to limbus only), moderate (growth extending up to 3 mm on the cornea, and advanced (growth occluding the visual axis on the cornea). All the patients with mild pterygium were treated with artificial tears (carboxy methyl cellulose-Refresh tears eye drops) and topical antihistamines (Antazoline eye drops) three times daily in the affected eye along with corticosteroid (dexamethasone) eye ointment at night were prescribed to relieve the symptoms. They were followed up once in three weeks. Corticosteroid at night was tapered to alternate days. The corneal epithelium healed well in all the eyes after the operation. The patients were prescribed Maxitrol eye drops (dexamethasone + neomycin) 4 times in the day and same eye ointment at night before going to bed for one week. The patients were again examined at the end of 1 week, 3 weeks and 6 weeks after the operation. The dosage of topical steroids was tapered slowly over a period of 6 weeks. At this stage, the steroids were stopped, and Refresh (carboxymethylcellulose) tears eye drops were prescribed three times daily for four weeks. The patients were followed up once in 3 months. During the post operative examinations, pyogenic granuloma, any recurrence of pterygium and the time of their occurrence after operation were noted.

III. RESULTS

A total number of 166 patients with primary pterygium were diagnosed during the study period. Pterygium was seen much more often in males (111, 66.9%); and male to female ratio was 2:1. The age of the patients ranged between 21 and 78 years with majority of them in the age group of 31-40 years (44, 26.5%). It was seen in more often in Malays (116, 69.9%) than in Chinese and Indians. The other races included 2 Sabahans and 4 Sarawakians. Seventy-four patients (44.6%) were armed forces personnel, and the rest were civilian patients in this study (Table I).

Patients presented to the eye clinic with varying symptoms; and irritation of eyes (49, 29.5%) was the most common presenting symptom in this study (Table II). Some of the patients presented with more than one symptom. Asymptomatic patients (23, 13.8%) were referred by medical officers of other departments who noted pterygium in the eyes. Ocular movement restriction was not present in any of the patients in this study.

Pterygium was seen nasally, temporally, nasal and temporal side in right or left eye in 96 patients, and in both eyes in 70 patients. A total of 248 pterygia were noted in this study (146 were mild, 94 were moderate and 8 were advanced). In patients with pterygium in both eyes, it was mild in one and both eyes. Out of the 102 pterygia (moderate and advanced) only 80 surgical procedures were performed (nasal or temporal- 66 eyes, nasal and temporal -7 eyes). The healing of corneal and conjunctival epithelial defect, any conjunctival granuloma or recurrence of growth again in the operated area were noted during the follow up period. The mean duration of postoperative follow up was 12.3 months with a range from 2 to 36 months.

The corneal epithelium healed well in all the eyes after the operation. However, small conjunctival granuloma (5 mm) were carefully dissected. Then the pterygium tissue was separated from the sclera together with Tenon’s fascia until 4 mm from the limbus; and the pterygium was excised with curved conjunctival scissors leaving behind bare sclera. Minimal wet field cautery was applied to maintain hemostasis. The corneal and limbal surfaces were smoothed by scraping with a Bart Parker blade. Following excision of the pterygium, the sclera was left bare. Chloramphenicol eye ointment was applied, and the eye was patched. Intraoperative or postoperative mitomycin c was not used in any of the operated eyes.

Postoperatively, the patients were seen on the next day morning for any oozing of blood and the extent of epithelial defect on the cornea. The patients were prescribed Maxitrol eye drops (dexamethasone + neomycin) 4 times in the day and same eye ointment at night before going to bed for one week. The patients were again examined at the end of 1 week, 3 weeks and 6 weeks after the operation. The dosage of topical steroids was tapered slowly over a period of 6 weeks. At this stage, the steroids were stopped, and Refresh (carboxymethylcellulose) tears eye drops were prescribed three times daily for four weeks. The patients were followed up once in 3 months. During the post operative examinations, pyogenic granuloma, any recurrence of pterygium and the time of their occurrence after operation were noted.

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was noted in 10 out of 80 eyes (12.5%). Postoperatively, the mean duration of its occurrence was 2 weeks — after 1 week in 2 eyes, 2 weeks in 6 eyes and 3 weeks in 2 eyes. All the patients were treated with intensive topical corticosteroid drops (one hourly) and oral indomethacin (25 mg tds). The granuloma resolved in all the eyes in 2-3 weeks without the need of surgical intervention.

TABLE I: DEMOGRAPHY OF PATIENTS (N=166)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>111</td>
<td>66.9%</td>
</tr>
<tr>
<td>Female</td>
<td>55</td>
<td>33.1%</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>21-30 years</td>
<td>32</td>
<td>19.3%</td>
</tr>
<tr>
<td>31-40 years</td>
<td>44</td>
<td>26.5%</td>
</tr>
<tr>
<td>41-50 years</td>
<td>39</td>
<td>23.5%</td>
</tr>
<tr>
<td>51-60 years</td>
<td>25</td>
<td>15.1%</td>
</tr>
<tr>
<td>61-70 years</td>
<td>18</td>
<td>10.8%</td>
</tr>
<tr>
<td>71-80 years</td>
<td>8</td>
<td>4.8%</td>
</tr>
<tr>
<td>Race</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Malay</td>
<td>116</td>
<td>69.9%</td>
</tr>
<tr>
<td>Chinese</td>
<td>37</td>
<td>22.3%</td>
</tr>
<tr>
<td>Indian</td>
<td>7</td>
<td>4.2%</td>
</tr>
<tr>
<td>Others</td>
<td>6</td>
<td>3.6%</td>
</tr>
<tr>
<td>Category</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Armed Forces</td>
<td>74</td>
<td>44.6%</td>
</tr>
<tr>
<td>Civilian</td>
<td>92</td>
<td>55.4%</td>
</tr>
</tbody>
</table>

TABLE II: PRESENTING SYMPTOMS (N=166)

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Irritation in the eye</td>
<td>49</td>
<td>29.5%</td>
</tr>
<tr>
<td>Blurred vision</td>
<td>45</td>
<td>27.1%</td>
</tr>
<tr>
<td>Watering of eye</td>
<td>44</td>
<td>26.5%</td>
</tr>
<tr>
<td>Redness of eye</td>
<td>44</td>
<td>26.5%</td>
</tr>
<tr>
<td>Foreign body sensation</td>
<td>18</td>
<td>10.8%</td>
</tr>
<tr>
<td>Photophobia</td>
<td>2</td>
<td>1.2%</td>
</tr>
<tr>
<td>Asymptomatic</td>
<td>23</td>
<td>13.8%</td>
</tr>
</tbody>
</table>

Recurrence of pterygium was observed in 19 out of 80 eyes (23.7%). Postoperatively, the mean duration of recurrence was 5.5 months — after 2 months in 1 eye, 3 months in 4 eyes, 4 months in 4 eyes, 6 months in 4 eyes, 8 months in 1 eye, 10 months in 2 eyes and 12 months in 3 eyes.

Out of these 19 eyes with recurrent pterygium, 7 were subjected to repeat surgery-conjunctival grafting in 3 eyes with follow up of 8, 32, and 33 months, application of mitomycin-C (0.02% for 2 minutes) in 2 eyes with follow up of 24 and 24 months, and postoperative mitomycin-C eye drops (0.02%) 2 times daily for three weeks in 2 eyes with follow up of 8 and 21 months. In all these patients carboxymethyl cellulose eye drops were put 3 times daily after the operation. Out of these 7 eyes, recurrence was again noted in 2 eyes — one in conjunctival graft after 2 months and one in bare sclera technique after 4 months.

Out of 166 patients 74 were armed forces personnel; 96 eyes of these people had pterygium. Out of this mild pterygium was 74 (59 from navy and 15 from army); and 22 had moderate pterygium (19 from navy and 3 from army). There were no persons from air force with pterygium in this study. All the patients with moderate pterygium were males. Excision of pterygium was done in 19 out of 22 moderate/advanced eyes. Five patients developed granuloma of conjunctiva (all from army); and recurrence of pterygium was noted in 11 eyes (8 from navy and 3 from army).

Recurrence of pterygium was observed to be higher in armed forces personnel (11 out of 19 eyes, (57.9%)) than in civilian patients (8 out of 19 eyes, 42.1%). There was early recurrence of pterygium in armed forces personnel (mean duration 5.1 months) than in civilian patients (mean duration 6.6 months).

IV. DISCUSSION

Surgery is the treatment of choice for pterygium. The bare sclera technique is the first to be adopted for pterygium removal and is characterized by simple excision, allowing the scleral bed to re-epithelialize. However, this technique tends to favor postoperative pterygium proliferation because small tissue residues may be left in the scleral bed, resulting in high recurrence rates (24%-89%) [8]. The recurrence of pterygium is the most common and significant complication of the above procedure.

Predicting factors of recurrence are not fully understood. Patients’ characteristics associated with higher recurrence are young age, current active growth, pre-existing disfiguration of lacrimal caruncle, ocular motility restriction, concurrent ocular surface inflammation, fibrogenic constitution, and family history [9]. Fleshy-like aspect of pterygium [10], greater vertical height of pterygium [9] have been reported to be associated with high recurrence rates. Using automated image analysis of anterior segment photographs, [11] demonstrated that increased vascularization of the pterygium had association with higher risk of recurrence.

The recurrence rate of 23.7% (19 out of 80 eyes) in primary pterygium was noted in the present study from Lumut, Perak state (Peninsula Malaysia), while a much high figure 33.5% (54 out of 161 eyes) of recurrence rate of the same was reported from Bintulu, Sarawak state (Malaysia Borneo) [7].

A lower recurrence rate than our study was reported from India (19.4%) [12]. However, a much higher recurrence rates of 36% [13] and 61.3% [10] were reported from Pakistan and Singapore, respectively.

In the present study, granuloma of conjunctiva was noted as a postoperative complication in 12.5% (10 out of 80) eyes. It was seen equally in armed forces persons and in civil patients. A much less frequency of postoperative granuloma (3.9%) was reported following pterygium surgery in Brunei [14]. However, 30% of postoperative complications following bare sclera technique in pterygium cases (in addition to recurrence of pterygium), which included scleral necrosis in 2 patients (6.6%), conjunctival cyst in 3 cases (10%), subTenon’s granuloma in 4 cases (13.3%) [13].

Bare sclera pterygium excision can cause surgically induced necrotising scleritis many years after the surgery. Four elderly patients who presented with scleral melt after pterygium excision without the use of adjunctive treatment in the form of β irradiation, mitomycin-C, or thiotapec were reported [15].

In a survey of surgical techniques in pterygium in Thailand, the highest number (164 out of 438, 37.4%) of the respondents preferred bare sclera technique in primary pterygium; and most of the respondents (87.4%) did not use the adjuvant therapies in primary pterygium [16].

Bare sclera technique is associated with higher recurrence rate following pterygium surgery. Reduced recurrence rates after modifications in the bare sclera technique (primary closure with surrounding conjunctiva, conjunctival auto graft only or with additional human amniotic membrane, human
amniotic membrane graft, conjunctival-limbal auto graft only or with additional human amniotic membrane) were reported in 920 patients (989 eyes) operated over 14 years [12].

Postoperative use of Argon laser and Excimer laser, topical Mitomycin C, Thioteppa, Fluorouracil, Cyclosporine A, and Monoclonal Antibodies Against Vascular Endothelial Growth Factor, β irradiation therapy with high-energy, betamission radioactive substances (Ruthenium 106 and Strontium 90) have been reported to reduce the pterygium recurrence [17], [18].

The excision of pterygium with bare sclera technique was done during the early years of specialist service of the author (SG). After finding out the high recurrence rate, the author has modified the technique with addition of intraoperative conjunctival auto graft to cover the bare sclera to reduce the recurrence rate and the study is in progress. The results will be published later.

V. CONCLUSION

The prevalence of recurrence of pterygium following excision with bare sclera technique was 23.7% in our study. The mean duration of recurrence was 5.5 months (range 2 - 12 months) after the operation. Recurrence was observed to be higher and early in armed forces personnel than in civilian patients. In addition to recurrence of pterygium, small granuloma of conjunctiva occurred in 12.5% following surgery.

REFERENCES