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A Comparative Study of Conjunctival Autograft and Minimally Invasive Pterygium Surgery in Primary Pterygia

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Abstract: This study aimed at comparing the results of the Conjunctival Autograft Technique (CAG) and Minimally Invasive Pterygium Surgery (MIPS) in primary pterygium excisions. This was a prospective randomized clinical study performed during a one-year period (2009-2010). One hundred and twenty two patients with primary pterygium were randomized in 2 groups: group A (CAG) including 36 patients and group B (MIPS) including 86 patients. The two groups were compared considering the recurrence rate and probable complications of the procedures. Recurrences were detected in 4 patients (11.1%) in group A and 5 patients (5.8%) in group B with no significant difference in this regard (p = 0.447). No major complications occurred during the follow-up period. This study showed that acceptable recurrence- free rates could be achieved (albeit nonsignificant) using MIPS technique in patients with primary pterygium and can be considered as a good alternative in the surgical management of pterygia because of its simplicity and low surgical time.

Key words: Pterygium, autograft, minimally invasive, surgery, outcome

INTRODUCTION

Pterygium is a common external ocular disease that is characterized by the fibrovascular overgrowth of degenerative bulbar conjunctival tissue onto the cornea (Coroneo *et al*., 1999). Previous studies have suggested that the sun ultraviolet ray is the most important environmental factor of the etiology of pterygium, but its exact pathogenesis is still unknown. Recent researches have also suggested that it may be a result of gene P53 mutations on chromosome 17 (Chowers *et al*., 2001; Chui *et al*., 2008). Surgical excision which is the treatment of choice for pterygium is generally essential when the visual axis is threatened and/or the pterygium causes sever irritation or cosmetic problems (Chui *et al*., 2008). Because recurrence is high from 24 to 89% after simple excision in pteryguim new surgical methods have been tried but recurrence still remains a major challenge (Sebban and Hirst, 1991; Nabawi *et al*., 2003). To prevent recurrence, a number of methods for pterygium treatment have been developed. Adjunctive therapies designed to reduce recurrence include application of antimetabolites, radiotherapy, excimer laser applications, amniotic membrane graft and free conjunctival autograft (Nabawi *et al*., 2003; Donnenfeld *et al*., 2003; Solomon *et al*., 2001; Young *et al*., 2004; Krag and Ehlers, 1992; Oguz *et al*., 1999; Figueiredo *et al*., 1997; Ti *et al*., 2000). Kenyon first described a Conjunctival Autograft Technique (CAG) in 1985. They reported a recurrence rate of 5.3% and infrequent and relatively minor complications. The primary disadvantage of the technique is the prolonged operative time required when compared to the bare sclera technique. The procedure gained popularity in many centers, and today most surgeons are inclined to choose excision of the pterygium with a conjunctival autograft (Varssano *et al*., 2002). However, it is proposed that more aggressive surgeries may increase the possibility of recurrence. Because the recurrence of pterygium has been attributed to fibroblast proliferation, large conjunctival excisions are associated with increased healing and scar response thus the fibrovascular activity should be stopped (Ozer *et al*., 2002; Kilic and Gurler, 2006). Also the limbal stem cell hypothesis of pterygium formation implies that the conjunctiva grows on to the cornea due to the loss of limbal stem cell barrier function. In another technique named as the Minimally Invasive Pterygium Surgery (MIPS), the conjunctival excision is minimized, the tenon capsule is preserved and a rather small conjunctival autograft is employed. These are the main advantages of the MIPS comparing with the CAG (Oguz *et al*., 2006). This study aims at comparing the results of the CAG and MIPS in primary pterygium excisions.

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MATERIALS AND METHODS

A total of 122 consecutive primary pterygia were enrolled in this study. This study was performed during a one-year period (2009-2010). Each patient underwent a complete ocular examination including visual acuity, slit lamp biomicroscopy, fundoscopy and intraocular pressure measurement. The pterygia were examined for laterality, length across the limbus and amount of its encroachment on the cornea. Exclusion criteria included preexisting conjunctival or corneal problems such as trauma or scar, bullous keratopathy, persistant epithelial defect, dry eye, glaucoma, collagen vascular disease. All patients had a nasal pterygium≤6 mm. The patients were randomly divided into 2 groups. Groups A conjunctival autograft (CAG) consisted 36 Patients (11 female and 25 male), mean age of 45.8±8.5 Years. Group B Minimally Invasive Pterygium Surgery (MIPS) consisted 86 patients (25 female and 61 male), mean age of 48±11.5 years (Table 1). All procedures were performed under topical or subconjuctival anesthesia with injection of Lidocain 2%. In the MIPS technique first a circum linear limbal incision was performed, the head of the pterygium was transected from its body then removed by blunt dissection and underling tenon capsule was kept intact. When the head of the pterygium was transected from the body, the bulbar conjunctiva retracted to a semilunar position posterior to the limbus. No further conjunctival nor were tenon capsule excisions made. Hemostasis was obtained by direct pressure and cauterization was not employed. Then a small conjunctival graft from the ipsilateral superior conjunctiva was performed to cover the nasal bulbar conjunctival defect. In the CAG after a topical anesthesia the head of pterygium was removed from the cornea then together with tenon capsule, the pterygium was dissected with wescott's scissors and bleeding was avoided with cauterization. A flap from the supratemporal bulbar conjunctiva was removed then sutured. After surgery all patients wore an eye patch for 24 h and were medicated with chloramphenicol eye drop four times daily for 2 weeks and betamethasone eye drop six times daily for 4 weeks. All procedures were performed by two surgeons. The sutures were removed after 2-4 weeks. All patients were examined in 1 day, 1 week, 1, 2, 3 and 6 months and 1 year postoperatively with slit lamp biomicroscopy for determining the presence or absence of recurrence or other complications. Recurrence defined as fibrovascular tissue invading the cornea >1.5 mm. The results were assessed with the student t and Chi-square tests. A value of $p<0.005$ was considered statistically significant.

RESULTS

One hundred and twenty two patients were enrolled in this study. All patients had primary pterygia and were matched for age and sex and pterygial size and side (Table 1). The mean follow up periods were 12.0±11.5 and 11.0±2.2 months for groups A and B, respectively ($p = 0.118$). The recurrence rate at different intervals is summarized in Table 2. Accordingly, although the total recurrence rate is higher in the CAG group, this difference was not statistically significant. The rates of recurrence on months 2 and 4 were higher in the CAG group and it was higher on month 5 in the MIPS group; however these differences were not statistically significant, either. Considering all the patients together, the mean age was 32.0±1.9 years for the recurring patients and 46.2±3.3 years for the others ($p = 0.023$). This means that the mean age of patients with recurrence was significantly lower. The sex was comparable between these two groups ($p = 0.232$). The mean time from pterygium surgery to impending recurrence was 2.8±2.5 month. All recurrences were observed in the first 6 month and all were at least 3 mm in size with fleshy contour. Upcoming complications during the follow-up period have been summarized in Table 3, the rate of these complications (including injection, photophobia, irritation, subconjunctival hemorrhage, low visual acuity, conjunctival cyst and corneal epithelial defect) were higher in the CAG group; however, only the rate of irritation was significantly different between the two groups.

Table 1: Demographics and general data of the studied patients

Parameters	CAG (n = 36)	MIPS (n = 86)	p-value
Age (year)	45.8±8.5	48.0±11.5	0.087
Sex (female/male)	11/25	25/61	0.870
Laterality (right/left)	16/20	45/41	0.427
Size of pterygium (<3/3 mm<)	11/25	27/59	0.927

Table 2: Rate of recurrence in the studied groups

Time of recurrence (month)	No. of recurrence		p-value
	CAG (n = 36)	MIPS (n = 86)	
2	3 (8.3)	2 (2.3)	0.870
4	1 (2.8)	2 (2.3)	0.427
5	0 (0)	1 (1.2)	0.927
Total	4 (11.1)	5 (5.8)	0.447

Data are shown as frequency (percent)

Table 3: Complications after surgery in both groups

Complication	CAG (n = 36)	MIPS (n = 86)	p-value
Injection	19 (52.8)	41 (47.7)	0.607
Photophobia	13 (36.1)	23 (26.7)	0.301
Irritation	15 (41.7)	18 (20.9)	0.019
Subconjunctival hemorrhage	10 (27.8)	19 (22.1)	0.501
Low visual acuity	2 (5.6)	1 (1.2)	0.208
Conjunctival cyst	4 (11.1)	5 (5.8)	0.253
Corneal epithelial defect	12 (33.3)	18 (20.9)	0.147

Data are shown as frequency (percent)

DISCUSSION

The recurrence of pterygium is an undesirable complication. Because of its high incidence and high recurrence rate after surgery, pterygium has become one of the most important ocular surface diseases. The pathological researches have shown that pterygium is mainly constituted by abnormal neoplastic vessels and fibroblasts and the extent of vessels and fibroblasts is the reliable index based on morphology to evaluate the recurrent probability of pterygium after excision. The aim of ideal pterygium surgery is to prevent the recurrence and obtain better outcomes. New approaches are still being tried to decrease the rate of recurrence after surgery. Currently the most common treatment is excision. Recurrence typically occurs within the first 1 year and recurrent pterygia are more aggressive than primary pterygia (Tseng *et al*., 1990). Many adjunctive medical therapies such as beta irradiation, appliance of thiotepa, 5 flurouracil and mitomycin C during or after surgery, triamcinolone around the wound edge, subconjunctival injection of Hyaloronidase and Avastin are performed in addition to many surgical techniques such as conjunctival, limbal or amniotic membrane grafting (Nishimura *et al*., 2000; Miyai *et al*., 2005). Different techniques are appropriate for reducing the recurrence rate. In this study, the recurrence rate for CAG technique was 11% and this was comparable with other reports ranging from 2 to 35% (Akura *et al*., 2001). The conjunctival autografing method has been the mainstay of the surgical excision (Miyai *et al*., 2005). This was first described by Kenyon *et al*. (1985). Conventionally a large excision of pterygium body and tenon capsulotomy and a large conjunctival autograft has been recommended. But this has clinically been noted that a large conjunctival defect created by pterygia excisions is associated with more aggressive healing response compared to smaller conjunctival defects (Miyai *et al*., 2005; Akura *et al*., 2001). It has been proved that aggressive healing responses are associated with large conjunctival defects and damaged limbal barrier function (Miyai *et al*., 2005). In this technique we removed small conjunctival tissue, reestablished limbal barrier and performed small conjunctival auto graft to cover the defect. This technique is less invasive because we removed only conjunctiva that invaded corneal surface or head of ptreygium, preserveing tenon capsule and eliminating cautery. During follow-up, the outcomes of MIPS with CAG technique were compared. Accordingly, this study showed that acceptable recurrence- free rates could be achieved with MIPS technique in patients with primary pterygium and can be considered as a good alternative in the surgical management of pterygia. However, it should be noticed that the recurrence rate was not significantly different between the two groups. This may be due to small sample size in this study. This is in contrast with Akura *et al*. (2001) report because they concluded that CAG is the preferred and effective technique for patients with primary or recurrent pterygia in spite of its greater degree of difficulty concerning technique and extended operating time with higher rates of success and lower rates of recurrence. There is no similar study about comparing the two techniques. Likewise the irritation rate was significantly lower in the MIPS method. This means a better acceptance by the patients and this also is in favor of this method of treatment.

CONCLUSION

This study showed that acceptable recurrence- free rates could be achieved using MIPS technique in patients with primary pterygium and can be considered as a good alternative in the surgical management of pterygia because of its simplicity and low surgical time.

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