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REVIEW ARTICLE

Outcome of Surgical Management of Pterygium

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ABSTRACT

Background: Pterygium is a raised, superficial, external ocular lump that extends onto the corneal surface and typically occurs over the peri-limbal conjunctiva. It is more prevalent in the tropics due to increased UV light exposure. Pterygia are noncancerous conjunctival growths that may need to be surgically removed due to their discomfort, aesthetic concerns, or visual impairment. After removal, pterygia frequently return. Preventing recurrence is the main objective of pterygiumtreatment; however cosmetic outcomes and complication rates are also taken into account. Although there are several approaches accessible, the optimal process is not universally agreed upon. There is a chance of problems and recurrence even with the greatest procedures. Various surgical techniques and graft attachment methods that are currently in use are covered in this overview. Newer methods that appear promising in preliminary research but need further testing before being suggested are also covered. The purpose of the review is to give surgeons a decision-making overview of the latest data and to assist researchers in formulating hypotheses.

Keywords: Conjunctival autograft, suture, glue, autologous blood.

INTRODUCTION

Pterygium comes from the old Greek word pterygion, which means "wing." It is a wing-shaped growth of benign, slowly proliferating fibrovascular tissue that starts in the subconjunctival tissues and can spread to the cornea, obstructing vision **[1]**. The exact cause of pterygium is unknown. Perhaps the most common risk factor for the development of pterygium is exposure to UV radiation**[2].** Pterygium is one kind of corneal deterioration. The likelihood of being affected increases with living in tropical and subtropical areas and with spending more time outside, particularly in dry, dusty, and bright environments**[1]**.It is thought to be connected to microtrauma from sun or dust exposure to the conjunctiva and cornea. Accordingly, it has been discovered that the prevalence of pterygium is higher among outdoor workers in Nigeria, South India, and Southwest China than among indoor workers **[3]**.

Ophthalmologists disagree about the best course of action for treating pterygia, both surgically and medically. The goal of medical treatment is to lessen the patient's ongoing discomfort and relieve their

inflammatory symptoms. In an effort to find a safe and efficient treatment, doctors have used a variety of toxic and relatively benign treatments for pterygium over the years, including radiotherapy, thiotepa, 5-fluorouracil, lead acid, urine, and, more recently, mitomycin C **[4].**

In modern medicine, lubrication with artificial teardrops or decongestants is used to improve cosmetics slightly and provide temporary comfort. Additional comfort is provided by topical NSAIDs, eye drops loteprednol (steroids or cortisone-like medications). Vasoconstrictive agents reduce redness, improve appearance, and combine antihistamines with decongestant drops to help prevent the effects of itching and edema linked to histamine **[5].**Throughout history, numerous surgical techniques have been employed; however, due to varying rates of recurrence, none of them have gained universal acceptance. Ninety percent of recurrences have been observed in the first and third month of most studies. Recurrences can be the result of surgery gone wrong, patient issues or environmental factors. Inadequate primary surgery can result in incomplete excision of the affected tissue, fibrotic tissue debris remaining in the cornea and limbus, irregularities in the sclera-corneal rough surface, tension in the conjunctival suture edges, dehiscence of the conjunctival edge, or an uncontrollably large inflammatory reaction.

Male patients, those under 40 years old, patients of Asian, African, American, and Hispanic descent, prolonged exposure to arid and dusty environments, and the existence of dry eye syndrome are among the patient and environment-related causes **[6].**

Following pterygium surgery, results can be classified into four aesthetic grades: grade 1: The operated site appears the same as it did before; grade 2: There are some small episcleral vessels visible in the excised area, but they do not extend past the limbus and do not contain any fibrous tissue; grade 3: There are more fibrous tissues visible in the excised area, but they do not invade the cornea; and grade 4: There is a true recurrence with fibrovascular tissue invading the cornea **[4]**.

Surgical outcome:

The recurrence rate is still the main outcome of pterygium surgery. It is commonly used in scientific publications to compare various pterygium removal techniques and is typically defined as a corneal recurrence of fibrovascular tissue. It is important to distinguish between pterygium recurrence and the typical scar and postoperative corneal opacity that remain after sufficient tissue removal. Using clinical data to modify recurrence risk and choose appropriate surgical techniques appears to be the most crucial step in the management of pterygium. After excision and limbal autologous grafting, patients who were Hispanic or had darker skin tones had a greater incidence of pterygium recurrence. This finding suggested a relationship between ethnicity and recurrence rate. Other patient-related traits like coincidental ocular surface disease, active preoperative pterygium growth, preoperative caruncle disfiguration, and genetic predisposition have also been linked to higher recurrence rates **[7].**

In addition, the conjunctival autografting technique reduces the recurrence rate just as well as the combined bare sclera technique

and mitomycin C (MMC). In contrast to combined bare sclera and MMC, conjunctival autografting was associated with a lower recurrence rate, according to other studies. Pterygium recurrence after conjunctival autografting has been reported at rates ranging from 1% to about 40%. Numerous studies have shown that the recurrence rate for primary pterygium is less than 15%, whereas the recurrence rate for recurrent pterygia is between 30% and 33%. Recurrence of pterygium three months following conjunctival autografting ranges from 0% to 16.7% when combined with adjuvant options, and recurrence six months following the procedure ranges from 3.33% to 16.7% **[8].**

Notwithstanding the issue of pterygium recurrence, a number of surgical techniques have been reported for its removal:

AvulsionTechnique:

Westcott scissors are used to cut the bulbar conjunctiva at the edge of the scleral portion of pterygium, and blunt dissection is used to release this portion from the underlying sclera. A second pair of forceps removes the perilimbal tissue to provide countertraction after the liberated portion of the pterygium is grasped and torn from the cornea with toothed forceps. A beaver blade is used to remove any remaining tissue from the corneal surface, and a diamond burr is used to polish the surface. The recurrence rate (23–75%) is comparable to that of other primary removal methods **[9].**

Primary Closure:

The pterygium's head and mid body are removed. After that, a tenonectomy takes place. Tenonectomy extends to the nearby rectus muscle, just below the conjunctiva. Both superiorly and inferiorly, relaxing conjunctival incisions are made around the limbus. After that, the conjunctiva is mostly and carefully closed. Only two instances of wound contamination and fifteen cases of wound dehiscence experienced the rare recurrences (2.1%)**[10].**

Transplantationofthe HeadofthePterygium:

The head of the pterygium is thought to be the source of its development. The Mc Reynolds procedure involves cutting the conjunctiva along the lower border of the body after separating the pterygium head from the cornea. The conjunctiva is then weakened above and below the incision, creating a cul-de-sac that leads to the lower fornix. The body of the pterygium is shaped more like a vertical than a horizontal strand. The body's blood vessels are tightly stretched over the sclera, covering the pterygium with the lower cul-de-sac conjunctive as they gradually obliterate. The new course of the pterygium is shaped so that conjunctiva covers the raw area at the limbus, which is the result of the removal of the head and back. Nevertheless, this procedure was found to have high recurrence rates **[4].**

Conjunctival Autograft:

The procedure takes a little longer and requires experience with the conjunctival autograft technique. Numerous studies revealed that utilizing fibrin glue could shorten the operating time and improve patient’s comfort in the postoperative phase when compared to suture-based surgery. As fibrin glue is expensive and carries a risk of infection, autologous blood fibrin can be used as a substitute. Cohen originally described autologous blood fibrin, a tissue adhesive made from donor plasma, for pterygia surgery

in 1993. Additionally, reports of successful conjunctival grafting procedures using autologous blood fibrin have been made**[4].**

- ***Conjunctival Rotational Autograft(CRA):***

The preservation of healthy conjunctiva in other unaffected areas was Spaeth's initial explanation of the benefit of CRA over other graft techniques. Pterygial tissue that had been excised was autografted and re-sutured into its bed during this 90-degree rotation. Later, the method was modified in a number of ways. **Karadag et al.** in treating primary pterygium, researchers compared the safety, effectiveness, and recurrence of 90- and 180-degree rotation autografts. They found that all techniques were successful and that the 90-degree rotation autograft was a simple, safe method for managing pterygium that had a lower recurrence rate than the 180-degree rotation autograft**[11]**.

- ***Limbal Conjunctival Autotransplant(LCAT):***

Limbal and peripheral corneal tissue make up about 0.5 mm of the limbal conjunctival autograft. Incorporating limbus epithelium into the conjunctival graft will improve both the anatomic and functional outcome. This will restore the limbus's barrier function and reduce the likelihood of pterygium recurrence. The range of the limbal autograft recurrence rate is 0 to 15% **[12].**Cross-graft recurrence, the proliferation of pterygial tissue that had previously been excised, and the conversion of the epithelial graft into pterygial tissue are the main reasons for recurrence following LCAT **[12]**.

Limbal Stem Cells Transplantation:

It appears likely that this procedure will allow the corneal epithelium to epithelialize the limbus, the peripheral cornea, and the nearby denuded sclera. Then, circumferential migration of limbal cells may benefit the limbal region**[13]**.

Amniotic Membrane Grafting:

It's also used to prevent pterygium from recurring. Its precise mechanism that bestows this advantageous effect on the amniotic membrane is still unknown. These grafts are thought to promote healing, reduce fibroblast proliferation and recurrence rates, and stimulate epithelial development in addition to suppressing TGF-beta. In addition, they have anti-inflammatory qualities. The growth factors and cytokine rates are regulated by the amniotic membrane. It is advantageous in cases of wide-area lesions, in wounds where conjunctival grafts are not feasible, and even in patients for whom glaucoma surgery cannot be performed after a transplant. Regrettably, the recurrence rates reported in the literature vary significantly; for primary pterygia, they range from 2.6% to 10.7%, while for recurrent pterygia, they can reach 37.5%. Usually, researchers combine mitomycin C with the amniotic membrane graft. A thorough tenonectomy is performed. Steroid injections following surgery are administered in varying quantities. This contributes to achieving a low risk of recurrence**[14].**

Pedicle conjunctival Flaps:

Similar to conjunctival autografts, pedicle conjunctival flaps involve only partial conjunctiva removal at the donor site, with the flap being positioned by the surgeon either by rotating it or sliding it into place. Four pterygium excision techniques were compared in a study by Alpay et al.: conjunctival flap reconstruction, intraoperative mitomycin C application, bare sclera, and conjunctival autografting

technique. It was discovered that the conjunctival flap technique had a poor cosmetic appearance and a recurrence rate of 33.3%, which was statistically worse than the conjunctival autograft. Among the complaints regarding the flap technique were those of irritation and photophobia. **[15].**

Complications of pterygiumsurgery (figure 1):

Intraoperative hyperemia and conjunctival hemorrhage are frequent occurrences. Using pressure hemostasis or thermal cautery to control the bleeding shortens the surgical procedure and makes it easier. It has recently been suggested that brimonidine tartrate be applied prior to surgery in order to enhance the surgical site's safety and comfort through brimonidine-related conjunctival whitening**[16].**Any of the adjuvant options used or the surgical technique itself may be linked to postoperative complications in pterygium removal. The majority of the early postoperative problems following pterygium surgery are not vision-threatening and go away quickly. Graft edema, bleeding or hematoma beneath the graft, and corneal scarring are some of these side effects. These conditions can resolve more quickly with pressure bandages and topical anti-inflammatory medications. Lamellar keratoplasty is a rare treatment option for severe and deep corneal scars. During the first postoperative examination, corneal epithelial defects and early postoperative chemosis are typically healed in less than a day**[17].**

Whether or not amniotic membrane transplantation (AMT) or autologous graft is used to cover the bare sclera, scleral thinning or ulceration is a potentially blinding consequence associated with the use of intraoperative beta irradiation or intraoperative and postoperative mitomycin C (MMC). Scleral thinning rate reports for intraoperative and postoperative MMC with concentrations of 0.02% and 0.04% show a similar range. Higher scleral thinning rate has been linked in some studies to longer application times and higher MMC concentrations. In pterygium surgery, delayed epithelialization is an additional severe complication of MMC. Additionally, reports of iritis have been made after intraoperative and postoperative use of MMC **[18].**

Numerous studies have highlighted the safety and tolerability of bevacizumab and cyclosporine A (CsA) as adjuvant options in pterygium surgery. According to a meta-analysis, there was no statistically significant difference in postoperative complications following pterygium surgery between the adjuvant bevacizumab group and the control group. Another meta-analysis of trials that used CsA as an adjuvant for pterygium surgery revealed that, in terms of all complications and conjunctival granuloma, the adjuvant use of CsA seemed to increase surgical safety; however, in terms of scleral thinning, there was no difference observed between the CsA group and the control group. As a result, administering bevacizumab and CsA can be considered safe supplements to pterygium treatment. Topical bevacizumab given after surgery may increase the risk of corneal epithelial defects **[19].**

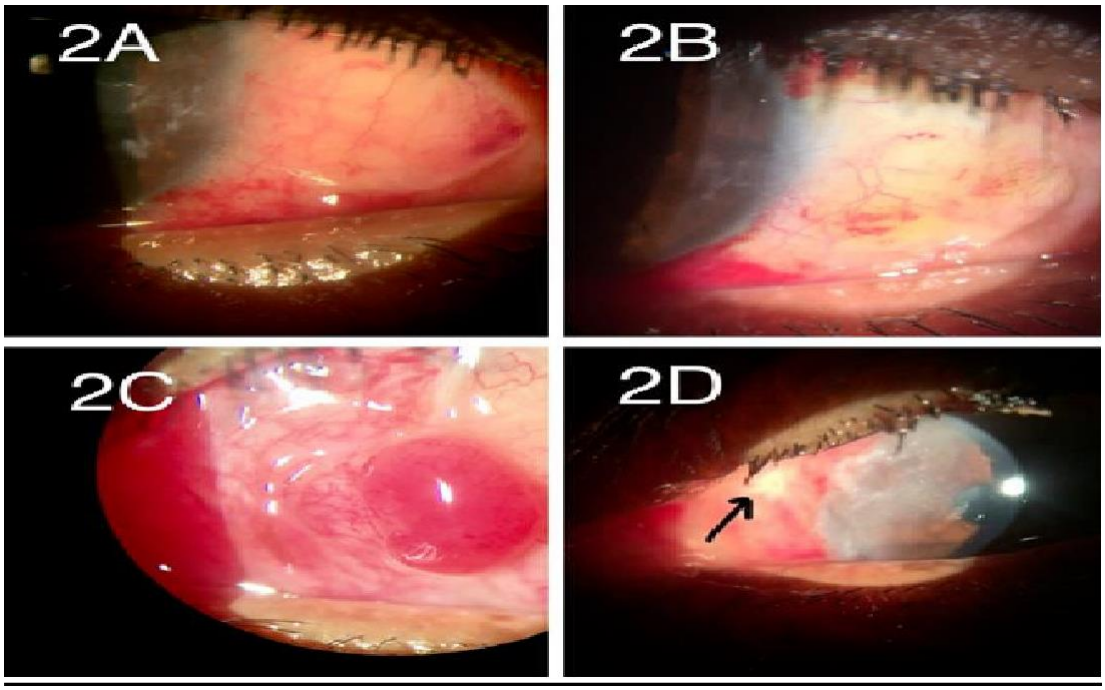

Figure (1): Post operative complications; A): Graft edema onpostoperative day 1; B): edema resolved on postoperative day 7 ofsamepatient;C):Granulomaformation;D):Avascularpatch[Arrow]).(Kiriet al.,2020).

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