

TECHNIQUE

Surgical Management of Pterygium

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■ ABSTRACT

This paper will discuss the different approaches to the surgical management of pterygium, emphasizing the conjunctival autograft technique and the use of antimetabolites.

■ HISTORICAL PERSPECTIVE

Clinically, a pterygium is a wing-shaped fibrovascular growth arising from the bulbar conjunctiva onto the superficial cornea.[1] It is composed of a body, which overlies the sclera, and a head, which conforms the leading edge. Stocker's line, an epithelial iron deposition at the advancing edge of the pterygium, is a common clinical feature. Pterygia are most often located in the interpalpebral fissure. A nasal presentation is more frequent, but temporal and even bilateral (kissing) pterygia have been described. Histopathologically, there is elastotic degeneration of the subconjunctival collagen.[2] Exposure to wind, dust, and a dry climate has been implicated in the development of pterygia. A recent publication suggests a fiberoptic type of transmission of ultraviolet light from the temporal side of the cornea, through the stroma and onto the nasal aspect of the eye, perhaps partially explaining why these lesions are more commonly found nasally.[3]

Nonsurgical management of pterygium includes the liberal use of topical lubricating solutions, the occasional use of vasoconstrictors or mild anti-inflammatory agents for flare-ups, and protection from ultraviolet light with sunglasses.

Numerous surgical techniques have been described since the early 1960s,[4] including the bare sclera technique, simple closure with absorbable sutures, sliding flap, rotational conjunctival flap, conjunctival autoplasty, mucous membrane graft, and conjunctival autograft. In addition, adjuvant therapy to some of these techniques may include the use of beta-therapy with strontium-90 and antimetabolite therapy with mitomycin C or fluorouracil.[5]

The indications for the surgical excision of a pterygium include continuous or recurrent irritation, decreased visual acuity, and an unsightly appearance. Decreased vision may occur due to an actual invasion of the visual axis, or even a peripheral distortion that induces with-the-rule astigmatism that is hemimeridional on the side of the pterygium.[6] The routine use of videokeratography in the preoperative evaluation of pterygium is beneficial in establishing the degree of visual compromise and in determining an improvement postoperatively.

■ TECHNIQUE

Pterygium Excision with Conjunctival Autograft

The use of a peribulbar or retrobulbar block is preferred when a conjunctival autograft is to be harvested and sutured in place of the removed pterygium. This ensures excellent cooperation from the patient and prevents problems during the crucial steps of graft manipulation. A 70:30 combination of 2% lidocaine HCl (AstraZeneca) and 0.75% bupivacaine chlorhydrate (Abbott Laboratories) provides good analgesia and akinesia of the globe.

It is useful to provide conjunctival vasoconstriction prior to initiating the procedure to reduce the amount of bleeding that occurs normally during pterygium surgery. The preoperative use of 1 drop of 1% apraclonidine hydrochloride (Iopidine, Alcon Canada) provides excellent conjunctival blanching without the excessive pupillary dilation observed with 10% phenylephrine. Next, the body of the pterygium is outlined using a surgical marking pen (Codman Surgical Marker, REF 43–1030, J&J Raynham). It is important to outline the minimal area of the pterygium body to be resected before excising the head of the pterygium. Once the advancing head is excised, there is a relaxing effect on the nasal conjunctival tissue. This will seemingly increase the area to be removed, and the surgeon may inadvertently end up excising a larger area

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of conjunctiva than needed, resulting in a larger-than-planned bare sclera defect.

A variety of methods exist to remove the pterygium from the corneal surface. These include simple avulsion of the pterygium head with forceps, passing a suture beneath it to dislodge it with a sawing motion, and dissection. Furthermore, some surgeons prefer a centripetal approach rather than a centrifugal one. A clean and simple way to excise the head of the pterygium consists of careful dissection from the corneal surface. Initially, a dry surgical spear is used to scrape the leading edge of the pterygium. Removal of the epithelium is achieved in this way. The tissue is then lifted using 0.12 utility forceps (Bausch & Lomb Surgical), presenting an adequate plane of dissection. A 25-g 5/8 needle (Beckton Dickinson & Co.) on a needle mount is used bevel up, parallel to the corneal plane, to sever the attachments to the cornea. A crescent knife (I-Knife, Alcon Canada) is used to complete the excision peripherally until the limbus is reached.

The area occupied by the pterygium body is bluntly dissected using Westcott scissors (Bausch & Lomb Surgical). Scissors are then used to cut along the previously outlined area, and a combination of blunt and sharp dissection is then used to free the tissue from the underlying sclera. Care should be taken to avoid damage to the rectus muscle while removing the nearby tissue.

It is important to remove Tenon's capsule to provide a clean scleral bed for the placement of a conjunctival autograft. Tenon's should also be removed from the subconjunctival space adjacent to the outline of resection. This provides a better surgical margin for proper tissue apposition and allows stretching of the conjunctiva to facilitate closure of the wound. There are two surgical planes that should be undermined, one between Tenon's and sclera and the second one between conjunctiva and Tenon's. Following this maneuver, Tenon's is firmly grasped with forceps and freed from the subconjunctival space. It is then sectioned by gently pulling while at the same time cutting with Westcott scissors, following the outline of the conjunctival margin of resection. Again, extreme care should be exercised to avoid damage to the medial rectus muscle while excising Tenon's. At times it may be necessary to identify and isolate this muscle using a muscle hook.

After the head and body of the pterygium have been completely excised, there are usually some tissue remnants on the cornea and limbal area. Although the cornea can be gently scraped with a blade to ensure removal of all surface cells, excellent polishing and smoothing of the surface can be achieved with the use of a diamond-tipped drill. We have successfully used the Xomed Power Systems XPS Model 2000 (Powerforma Drill, Medtronic Xomed) with a 5-mm (64-mm length) round, fine diamond bur (Cat. No. 31–21569) (Fig. 1). The settings are straight shot #1 at 10,000 rpm. Close to the diamond drill tip, the system has a needle that allows for continuous irrigation during polishing (Fig. 2).

To prevent burns and uneven removal of tissue, the bur is passed in circular motions while the surface is irrigated (Fig. 3). Care should be taken to avoid excessive polishing, as the pterygium does not extend deeply into the cornea. The smooth surface that results aids in reepithelization and healing.

Polishing with the diamond bur should be performed using continuous irrigation. Avoid staying in one single area for too long; this may result in an irregular corneal surface.

Excessive application of cautery should be avoided. Once the preliminary surgical steps have been completed, light bipolar cautery may be applied to obtain hemostasis of the scleral bed and limbal region.

Three measurements are required to size the autograft: width at the limbus, width of the lesion nasally, and distance from the limbus to the margin to be excised nasally. This area usually measures at least 5 × 5 mm.

The conjunctival autograft harvest site is usually in the superotemporal bulbar conjunctiva. This location in an oblique quadrant will avoid inadvertent injury to an extraocular muscle, while its position under the upper lid will aid with patient comfort and healing of the donor site. The four quadrants of the autograft harvest site are marked with ink or cautery to ensure appropriate sizing to fill the defect left by the excision (Fig. 4). A superficial incision is made on the nasal and temporal boundaries of the harvest site using a vertically placed crescent knife. This leaves the limbal and fornix boundaries as fixation points

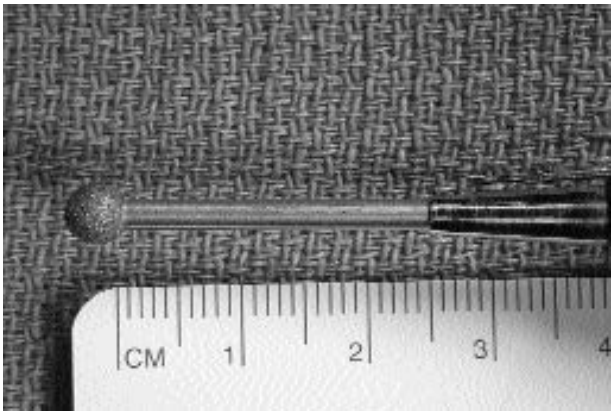

FIG. 1. Diamond drill-tip (5-mm) assembly for polishing the corneal and limbal surfaces.

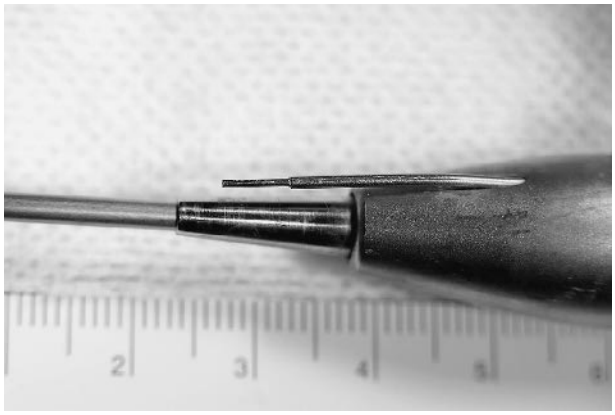

FIG. 2. The needle on the right allows for continuous irrigation during polishing.

for the graft dissection. Using Westcott scissors, the conjunctiva is separated from the underlying Tenon's capsule until the opposite boundary is reached. Next, the most posterior or fornix boundary is sectioned, and the conjunctival flap is reflected anteriorly over the cornea. The conjunctival autograft is further dissected using a combination of blunt and sharp dissection. Care should be taken to obtain conjunctiva alone, as this will allow the graft to stretch more easily to cover the defect, will help with healing of the autograft site, and will minimize the risk of significant postoperative graft edema. One should also avoid handling the autograft with forceps so as not to damage it. Retraction of the flap during dissection can be performed with surgical spears (Fig. 5) or nontoothed forceps if necessary to avoid creating buttonholes. Pressing the reflected flap down onto the cornea makes the subepithelial fibers that overlie the sclera taut. An excellent description of careful conjunctival dissection has been published by Eisner.[7] The scissor blades held vertically can divide these fibers easily. As one approaches the anterior limbal area, a crescent knife is held obliquely and careful dissection is performed until the limbal palisades of Vogt are reached.

Avoid manipulating the conjunctival autograft excessively. Use a minimal-touch technique with the help of surgical spears.

This will provide some stem cells for re-epithelialization of the resected bed. Care should be taken to dissect parallel to the limbus at all times. The harvesting of the autograft may be completed with Westcott or Vannas scissors placed flat against the cornea. No irrigation should be used until the two anterior cardinal sutures are placed.

Once the conjunctival autograft has been cut from its attachment, do not irrigate the ocular surface until the two limbal sutures have been placed. This will prevent washing out of the graft and will ensure that proper orientation of the graft is maintained.

It is important to maintain proper orientation of the autograft while transferring it to the site of the pterygium excision. The resected graft may be slid over the cornea, oriented limbus-to-limbus, and then flipped over with a draping motion to ensure that the epithelial side is up. The autograft is sutured into position using 10–0 nylon sutures (TG6-S needle, Cat. No. 7721G, Johnson & Johnson) in simple interrupted fashion. The anterior (limbal) corners of the autograft are first sewn into place to stretch the tissue, taking an episcleral bite to anchor the graft. Subsequent, equidistant sutures are more superficial to allow for some mobility. The donor site is closed with a single 10–0 nylon suture (Fig. 6). Sutures are cut longer than usual to allow for movement with blinking, to provide more comfort than short stubby ends, and for ease of grasping at the time of removal. Sutures are removed 2 weeks postoperatively.

The lid speculum is carefully removed. Topical antibiotic ointment is applied predominantly in the area of the graft, and the eye is covered tightly with a double patch.

Postoperatively, a combination antibiotic–steroid ophthalmic solution is used four times daily, and tapered over a 1-month period. Liberal use of viscous artificial tears or lubricating gels is advised.

■ DISCUSSION

We have previously reported on the comparison of three techniques used to treat primary pterygium:[8] bare sclera resection with and without use of mitomycin C and conjunctival autograft placement. The purpose of our study was to determine through a meta-analysis the risk for postoperative pterygium recurrence comparing these three surgical modalities. We obtained all randomized controlled clinical trials comparing at least two of the three surgical techniques in the treatment of primary pterygium. Five eligible studies with an adequate quality score were retrieved, three comparing bare sclera resection with and without mitomycin C use, one comparing bare sclera resection with conjunctival autograft placement, and one comparing both. The pooled odds ratio for pterygium recurrence in patients who had only bare sclera resection was 6.1 (95% confidence intervals, 1.8–18.8) compared with patients who had conjunctival autograft placement and 25.4 (9.0–66.7) compared with patients

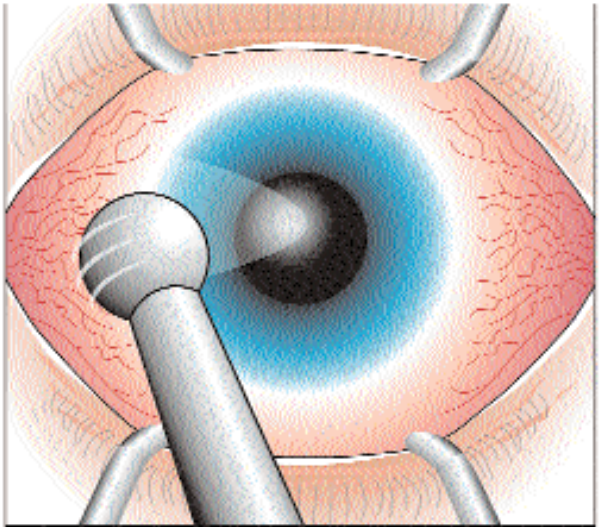

FIG. 3. After the pterygium is excised, the limbal and corneal areas are polished. Continuous irrigation is used.

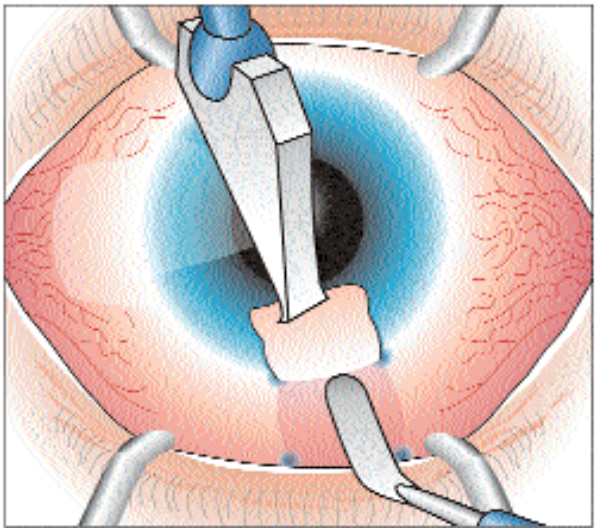

FIG. 5. Care should be taken not to damage the conjunctiva. Surgical spears are useful for applying gentle but firm traction during dissection.

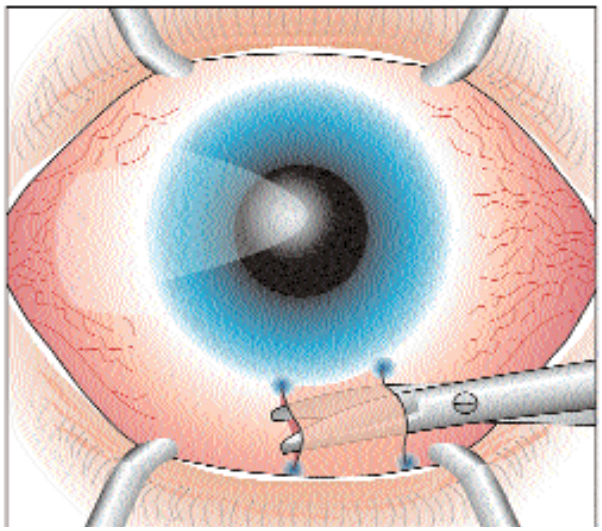

FIG. 4. The conjunctival harvest site is in the superotemporal area. The graft is gently undermined using Westcott scissors.

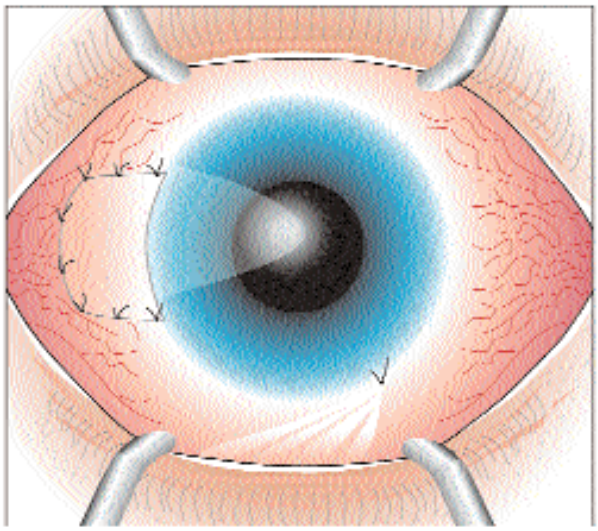

FIG. 6. Conjunctival autograft in place. Interrupted 10–0 nylon sutures are shown.

who received mitomycin C. We concluded that the odds for pterygium recurrence following surgical treatment of primary pterygium were close to 6 and 25 times higher if no conjunctival autograft placement was performed or if no intra- or postoperative mitomycin C was used, respectively. Surgeons should not be encouraged in the use of bare sclera resection as a surgical technique for primary pterygium. Furthermore, the use of conjunctival autograft in primary pterygium is advocated over mitomycin C or beta-therapy because of the lower risk of untoward events such as scleral thinning and melting.

When used, 0.02% (0.2 mg/mL) mitomycin C is applied to the scleral bed from 30 seconds to 2 minutes, and then profuse irrigation with balanced salt solution is performed. In a recent study, Cheng et al.[9] found that a single intraoperative application of 0.02% mitomycin C for 30 seconds after pterygium excision was associated with minimal complications. However, in comparison with conjunctival autografting, this approach was found to be less efficacious in preventing recurrences.

Conjunctival autograft may not always be technically feasible. When very large conjunctival defects are left to

cover, such as in primary double-headed pterygium, or when the superior bulbar conjunctiva needs to be preserved for future glaucoma surgery, other alternatives need to be sought. Amniotic membrane transplantation[10] (AMT) is safe and effective and may be employed in conjunction with other techniques, such as limbal transplantation. Its use in covering the bare sclera area following pterygium removal is comparable to conjunctival autograft, as described above.

In this article, I have discussed the use of interrupted 10–0 nylon sutures to secure the conjunctival autograft. Typically, the first 2 weeks postsurgery are associated with some discomfort and foreign body sensation. All sutures are removed after 2 weeks, after which the symptomatology decreases dramatically; the conjunctival inflammation disappears by the fourth week. I prefer this approach because the interrupted nature of the sutures allows for any fluid buildup to escape through the intervening spaces. In addition, minimal reaction is associated with nylon. The drawback of this approach is that some patients may not be as cooperative at the slitlamp at the time of suture removal. Alternatively, 10–0 nylon may be used as a running suture, or 10–0 Vicryl (CS140–6 needle, Cat. No. V9606, Ethicon, Johnson & Johnson) either as interrupted (short knots) or running suture eliminates the need for suture removal postoperatively. Although more practical, I have found more inflammation at the wound edges with the use of Vicryl.

Finally, in secondary or recurrent pterygium there is usually more scar tissue present. Preoperative assessment should include a motility examination to rule out entrapment of the medial rectus muscle. During surgery, the medial rectus muscle should be isolated with a muscle hook, and the dissection should proceed carefully and meticulously. Mitomycin C 0.02% is employed as described above, followed by a conjunctival autograft.

In conclusion, although it is more time-consuming, it certainly is worthwhile to provide patients the benefits of a conjunctival autograft following excision of pterygium.

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