

Closing the Fornix-Based Flap

An overview of the requirements for success.

By Craig Marcus, MD



The fornix-based trabeculectomy provides a unique surgical challenge, because the procedure's success or failure may hinge on its final step: conjunctival closure. I consider this the sole disadvantage of a fornix- versus limbus-based approach.

Conjunctival closure requires a fastidious surgical technique. The consequences of imperfection (ie, leakage) can range from mere inconvenience to a failed trabeculectomy and even a loss of vision. Early leakage that resolves may only temporarily blur vision and potentially increase the risk of infection. An accompanying shallow chamber and hypotony, however, may lead to a choroidal effusion, cataract formation, anterior or posterior synechiae formation, hypotony maculopathy, endophthalmitis, or a suprachoroidal hemorrhage.

TYPE AND CALIBER OF THE SUTURE

Despite some recent reports of the conjunctiva's successful closure at the limbus with tissue glue,^{1,2} most surgeons rely on sutures. Essentially, the choices boil down to the type and caliber of the suture and the technique (ie, running or interrupted). Using fine-point tapered or BV needles ensures that the suture's caliber will be similar to or less than the diameter of the needle and thus will prevent leakage around the needle track.

Most ophthalmologists use 9-0 or 10-0 sutures. The more delicate 10-0 is likely to be less inflammogenic but has less tensile strength than 9-0. An 8-0 suture, either absorbable or not, has superior strength but tends to be more inflammogenic, is a bit bulky at the limbus, and can cause discomfort for the patient.

Absorbable and not absorbable sutures each have their advantages. Nonabsorbable 10-0 nylon tends to hold its tension throughout the postoperative period and beyond, but it may require removal if the end of the suture becomes exposed or loose. Removal is at least a nuisance, but occasionally it disturbs the overly-



Figure 1. Conjunctival closure with a 9-0 running Vicryl (Ethicon Inc., Somerville, NJ) technique.

ing tissue sufficiently to cause leakage. A tight nylon suture may also induce astigmatism that will only resolve with the suture's removal, which could compromise conjunctival closure if performed too early. An absorbable suture generally need not be removed, but its strength may be for naught if it dissolves before the tissue's adherence is complete.

TECHNIQUE

The three typical variations are (1) two tight wing sutures, (2) multiple horizontal interrupted mattress sutures, and (3) a running suture in either a horizontal mattress or baseball-type technique (Figures 1 and 2). The first requires perhaps the least work but the most precision, because the center of the wound will depend on tension alone to be watertight. The advantage of this technique is that it requires the fewest passes of the needle and the least manipulation of tissue. Wing sutures should be placed relatively parallel to the limbus, both to decrease astigmatism and to maximize the area of contact between the underlying conjunctiva and corneal limbus. The sutures can be simple or horizontal mattress. Alternatively, the surgeon may place two additional wing sutures laterally to the primary sutures to further reinforce the closure.

The other two suturing techniques are similar in that each uses multiple points to tack down the overlying conjunctiva. The fewer knots of the running suture are



Figure 2. Running suture technique for conjunctival closure.

advantageous. If, during its placement, the running suture breaks, however, then the work has to be repeated, unlike with multiple sutures. For the running technique, the surgeon will place and tie a wing suture without taking off the needle. Next, he or she will take a second, very closely adjacent bite to engage the limbus (or cornea), followed by a conjunctival bite. The sequential engagement of the tissues continues until the entire wound has been sewn. Before tying the final pass, the surgeon adjusts the suture's tension by a hand-over-hand or alternative technique to ensure that the suture is taut. This cinching is critical to preventing leakage. Either a horizontal mattress or a baseball style can be used with a running technique. Because the interrupted, multiple-suture technique avoids this dependence on cinching of a single suture, it may be easier to perform, but it requires more knots. With multiple sutures, some surgeons employ a small corneal trench created with a fine blade to more easily bury the interrupted sutures.

In all three techniques, burying the suture enhances patients' comfort. Horizontal mattress sutures passed

appropriately will embed themselves, or the knots can be rotated to bury them. Some surgeons will place a contact lens after conjunctival closure to reduce trauma to the wound by the eyelids, ensure the wound's compression, and increase patients' comfort.

Regardless of the chosen technique, the surgeon must check the wound for leakage visually and, if desired, with Seidel testing. Filling the chamber with some balanced salt solution and observing flow through the trabeculotomy but not through the overlying conjunctiva confirms a watertight closure. If the surgeon observes leakage, additional suturing is required.

CONCLUSION

Conjunctival closure is perhaps the most essential (and vexatious) step in trabeculectomy/filtering surgery. Certainly, however, it is facilitated by the surgeon's meticulous attention to the preceding steps of the procedure. In brief, the conjunctival incision must be as atraumatic as possible. Minimal and delicate handling of the tissue with a toothless forceps and not creating buttonholes are essential. When using antimetabolites, the surgeon must carefully prevent the agent from seeping onto either the edge of the conjunctiva or the limbus. The adherence of these two tissues is necessary for the flap's watertight seal.

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