Comparison of Fibrin Glue and Sutures for Conjunctival Wound Closure in Strabismus Surgery

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Purpose: To evaluate and compare the efficacy and tolerance of fibrin glue and sutures for closing conjunctival wounds in strabismus surgery.

Methods: In a prospective trial, we performed strabismus surgery using limbal incisions. Conjunctival wounds were closed with fibrin glue in 20 eyes of 20 patients (fibrin group) and 8-0 polyglactin suture in 20 eyes of 20 patients (suture group). Postoperative pain, tearing, and inflammation were compared at 1 day, 1 week, 3 weeks, and 6 weeks after surgery. Conjunctival incision healing was also investigated.

Results: One day and one week post-operatively, pain and tearing scores were lower in the fibrin group (p = 0.000, respectively). Mean surgery time was significantly shorter in the fibrin (48 ± 5 minutes) than the suture group (63 ± 7 minutes) (p = 0.000). Inflammation was significantly more severe in the suture group until 3 weeks post-operative (p = 0.000, respectively), but conjunctival healing did not differ between the groups. Hyperemia appeared more prominent in the fibrin group 3 and 6 weeks after surgery (p = 0.087 and 0.000, respectively). Two eyes in the fibrin group showed conjunctival gaps of more than 2 mm, which closed spontaneously by three weeks after surgery. No allergic reactions or infections developed.

Conclusions: Fibrin glue proved to be as effective as sutures in closing conjunctival wounds. It provides more comfortable early postoperative courses and might be considered as an alternative to sutures in strabismus surgery.

Key Words: Conjunctival wound closure, Fibrin tissue adhesive, Polyglactin suture, Strabismus surgery

Polyglactin 8-0 suture is commonly used to close the conjunctiva in conventional strabismus and other ocular surgeries but can cause significant irritation and discomfort in the early postoperative period. Also, other suture-related complications might occur, such as prolonged inflammatory reaction at the suture site, suture granuloma or abscess, and giant papillary conjunctivitis [1]. To avoid these drawbacks, sutureless wound closure with fibrin-based tissue adhesives has gained increased acceptance in ocular surgeries including corneal perforation [2], leaking filtration blebs [3], conjunctival autograft for pterygium [4-6], cataract wound closure [7], pars plana vitrectomy [8,9], and conjunctivochalasis [10,11].

Fibrin sealant is biological glue made of fibrinogen and thrombin. The adhesive properties of fibrin glue have proven useful in preventing excessive bleeding and enhancing tissue adhesion in selective general and cardiovascular surgeries [12,13]. In strabismus surgery, fibrin glue has been tried to close conjunctival wounds [14-16] and attach extraocular muscle [17,18]. Many previous studies concluded that fibrin glue caused less postoperative discomfort and shortened surgical time, but few reports objectively compare fibrin glue and sutures along a time course of conjunctival wound healing.

In this prospective study, we evaluated the clinical efficacy and tolerance of fibrin glue for conjunctival wound healing in usual strabismus surgery and compared it with conventional suturing by analyzing objective parameters.

Materials and Methods

This prospective clinical study involved 40 patients who...
underwent primary strabismus surgery at Bucheon St. Mary’s Hospital from July 1, 2007 to December 31, 2007. Subjects were chosen from patients diagnosed with esotropia or exotropia who were planning to undergo primary horizontal extraocular muscle surgery. Exclusion criteria included a history and/or signs of ocular inflammation or hypersensitivity to ocular drugs. Thirty-four patients had exotropia and 6 had esotropia. Written informed consent was obtained from the patients or parents. A random number was assigned to each patient before the operation and odd numbers were assigned to the fibrin group and even numbers to the suture group. Each group contained 20 eyes in 20 patients. Radial limbal conjunctival incisions were used in all patients.

**Preparation of fibrin tissue glue**

Fibrin glue is a tissue adhesive composed of two components that mimic natural fibrin formation. One component contains fibrinogen mixed with coagulation factor 13 and aprotinin, and the other contains thrombin and calcium chloride. When the two components are mixed, thrombin converts fibrinogen into fibrin which is then cross-linked by coagulation factor 13 to create a firm fibrin clot. The fibrin clot is stabilized by Aprotinin which also prevents rapid fibrinolysis. In this study, commercially available Greenplast® fibrin glue (Green Cross, Seoul, Korea) was prepared according to the manufacturer’s instructions. Both components are placed in a dual injection system for simultaneous injection. A human thrombin solution (500 IU/mL) was used to ensure faster fibrin formation.

**Surgical technique**

Horizontal strabismus surgery under general anesthesia was performed by a single surgeon (NYK). After making an 8 mm peritomy with two radial limbal conjunctival incisions, performed bilateral symmetrical extraocular muscle recession or resection, unilateral recession-resection procedure or unilateral large recession was performed. After completing the muscle surgery with the lid speculum in place, the conjunctival wound was closed without tension. Excessive Tenon’s capsule was excised in all cases.

In the suture group, conjunctiva was closed with 4 to 6 stitches of interrupted 8-0 polyglactin suture (Vicryl®; Johnson & Johnson, Livingston, UK). Loose ends of the knot were cut shortly. When closing with glue (fibrin group), the location on the sclera where glue was intended to be applied was dried using a Weck-Cel sponge. One or two drops of both components were instilled simultaneously on the bare sclera near the limbus and just below the free edges of conjunctiva, which were held with forceps. Immediately