

# Conjunctival suture internal or external knotting in strabismus surgery: effect on healing and comfort

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## ABSTRACT

**Objectives:** To evaluate the effectiveness of the conjunctival suture tied internally and externally on patient comfort and suture dissolution in the postoperative period in patients who underwent symmetrical strabismus surgery.

**Methods:** In 50 patients who underwent surgery in the Beyoğlu Eye Training and Research Hospital Strabismus Unit, the conjunctiva was closed by tying the conjunctival suture externally in the right eye and internally tying the left eye. Absorbable 8/0 polyglactin suture was used for conjunctival suturing in all patients. Pain, itching, tearing and, discomfort sensations of the patients were questioned and a slit-lamp examination for conjunctival inflammation and dissolution of the suture were evaluated on the postoperative 1<sup>st</sup> day, 1<sup>st</sup> week, 1<sup>st</sup> month, and 6<sup>th</sup> weeks.

**Results:** Twenty-two patients were female and 28 were male. The mean age of the patients was  $7.24 \pm 4.83$  (range: 4-17) years. When the pain, stinging and discomfort of the patients were questioned, 46% of the patients stated that they felt more comfortable in the left eye on the 1<sup>st</sup> and 10<sup>th</sup> days, while 48% of the patients stated that they were equal in both eyes. When we evaluated the melting of the suture and conjunctival redness, it was observed that the suture in the left eye was melted prematurely at a rate of 40% and, the conjunctival redness resolved early in the first month. There were equal pain and redness in both eyes at a rate of 54%.

**Conclusions:** In strabismus surgery, the closure of the conjunctiva by tying the suture internally is thought to increase patient comfort in the postoperative period.

**Keywords:** Conjunctiva, suture, melting, irritation

The polyglactin 8-0 suture is a frequently used in ocular surgery and is especially preferred for closing the conjunctiva. This suture is preferred for conjunctival closure also in strabismus surgery. It has an average 56-70 days absorption rate. Due to the small diameter of this suture, and its non-antigenic structure, the fact that it causes less tissue reaction compared to other materials, but it can also cause discomforts like

itching and foreign body sensation especially in the early postoperative period. These complications include prolonged inflammatory reaction at the suture site, suture granuloma or abscess and, giant papillary conjunctivitis [1, 2]. To avoid these drawbacks, conjunctival suture with internal ligation can be applied.

The aim of this study is to compare the absorption rate of the conjunctival suture knotted internally and

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externally and to evaluate its effect on patient comfort.

## METHODS

Hundred eyes of 50 patients who underwent bilateral symmetrical surgery were included in the study. Ethics committee approval was obtained from the Okmeydani Training and Research Hospital. This study was conducted in accordance with the principles of the Declaration of Helsinki and written informed consent was obtained from the patients/parents following a detailed explanation of the study objectives and protocol. This study was conducted at our hospital from 2017 to 2019.

The suture material was 8-0 polyglactin 910 (Vicryl®; Johnson & Johnson, Livingston, UK) Externally conjunctival suture tying was used to close conjunctival incisions in the right eye and, internally tying in the left eye of 50 patients during strabismus surgery. At the end of the operation, eyes were closed with antibiotic pomade. Antibiotic and corticosteroid combination eyedrops (tobramycin 0.3%+dexamethasone 0.1% mg) were continued 4 times a day for 3 weeks.

Postoperative follow-ups were done with a slit-lamp examination performed on the 1<sup>st</sup> day, 1<sup>st</sup> week, 1<sup>st</sup> month, and 6<sup>th</sup> week. The conjunctival redness, inflammation and absorption of the suture were determined by slit-lamp examination and recorded. Ocular irritation scores questioning itching, pain and, foreign

body reaction were asked to all patients and their parents of incompatible age group patients. The subjective discomfort scale was graded from 0-to-3 according to the answers given by the patient (0, total comfort; 1, minor discomfort; 2, moderate discomfort; 3, severe discomfort) [3-5].

Objective evaluation of conjunctival inflammation was made by the same physician(CG) by examining the operated conjunctival quadrant using a slit-lamp biomicroscope. A modified conjunctival inflammatory index (Table 1) in which hyperemia, chemosis, and discharge were rated on a 0 to 3 scale (0, none; 1, mild; 2, moderate; 3, severe) for a maximum possible inflammation score of 9 used for grading [5-7].

## Surgical Technique

Horizontal strabismus surgery under general anesthesia was performed by the same surgical team. After making a fornix-based two radial limbal conjunctival incisions, performed bilateral symmetrical extraocular medial or lateral rectus muscle recession was performed. The conjunctival wound was closed in both eyes with 2-3 stitches of interrupted 8-0 polyglactin suture after completing the muscle surgery. In the right eyes with external knot suture, the conjunctiva was closed with a conventional method. Loose ends of the knot were cut short. In the left eyes with an internal knot, the first pass of the suture started under the conjunctiva, passed through the opposite side conjunctiva from above, and was removed from under the conjunc-

**Table 1. Conjunctival inflammation grades**

	Scales	Values
Conjunctival hyperemia	0	Absent
	1	Mild hyperemia
	2	Hyperemia around the wounds
	3	Hyperemia around the wounds and entire quadrant
Conjunctival discharge	0	Absent
	1	Small discharge on conjunctiva
	2	Discharge on conjunctiva and cornea
	3	Discharge on conjunctiva, cornea, and eyelid
Conjunctival chemosis	0	Absent
	1	Mild chemosis
	2	Chemosis around the wounds
	3	Chemosis around the wounds and entire quadrant

tiva and tied there. The suture was cut just above the knot without allowing any suture tip to be exposed.

### Statistical Analysis

Statistical analysis was performed with SPSS 20 pocket program (SPSS Inc., Chicago, IL, USA). In the evaluation of data, repeated statistical methods as well as paired t-test, variance analysis of multiple groups, Pearson correlation test for the relationship between variables were used. A *p* - value of less than 0.05 was considered statistically significant.

## RESULTS

The mean age of the patients was  $7.24 \pm 4.83$  (range: 4-17) years. Twenty-two patients were female and 28 were male. Mean total surgery times were similar in both eyes ( $17 \pm 4$  minutes). When the pain, tearing and, discomfort of the patients were questioned, 46% of the patients stated that they felt more comfortable in the left eye on the 1<sup>st</sup> and 10<sup>th</sup> days, while 48% of the patients stated that they were equal in both eyes. When we evaluated the dissolution of the suture and conjunctival redness, it was observed that the suture in the left eye was melted prematurely at a rate of 40%, the conjunctival redness resolved early in the first month. There was equal redness in both eyes at a rate of 54%. Table 1 shows the ocular irritation scoring.

Postoperatively at 1<sup>st</sup> day and 1<sup>st</sup> week, the pain

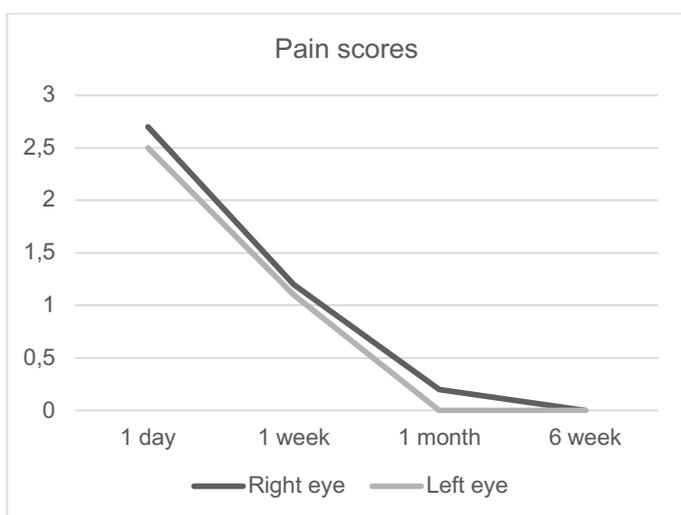
and tearing scores were lower in the left eyes than in the right eyes, but it was not significant ( $p > 0.05$ ) (Figs. 1 and 2). The mean duration of discomfort was  $2.9 \pm 0.8$  days in the left eye and  $3.2 \pm 1.2$  days in the right eyes ( $p > 0.05$ ). The inflammation was lower in the left eyes for the first month ( $p > 0.05$ ) (Fig. 3).

Conjunctival incisions had successfully closed in both eyes of all patients in the 1<sup>st</sup> month postoperatively. Tenon’s capsule prolapse through the conjunctival incisions, scarring, allergic reaction or infection was not occurred in none of patients.

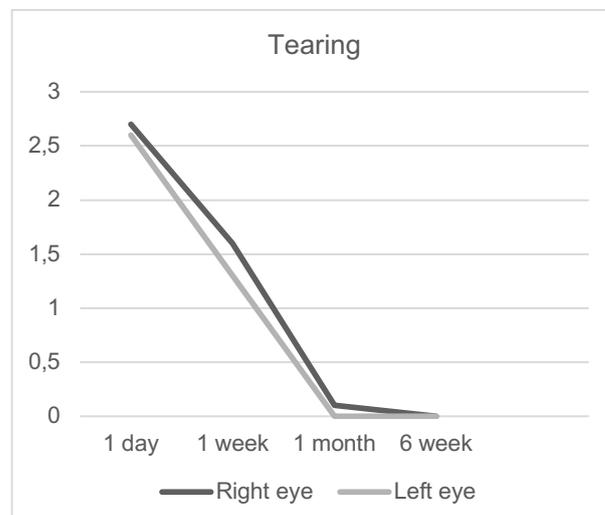
## DISCUSSION

Proper closure of the conjunctiva is essential for successful strabismus surgery. The suture material to be selected is important for this. Polyglactin 8-0 sutures are commonly used. Although this suture is a material that can absorb, it can cause irritation and discomfort during the early postoperative period. This may delay the patient's return to his/her normal life and cause loss of workforce in adult patients, and difficulty in opening eyes and restlessness in young children [5, 8, 9].

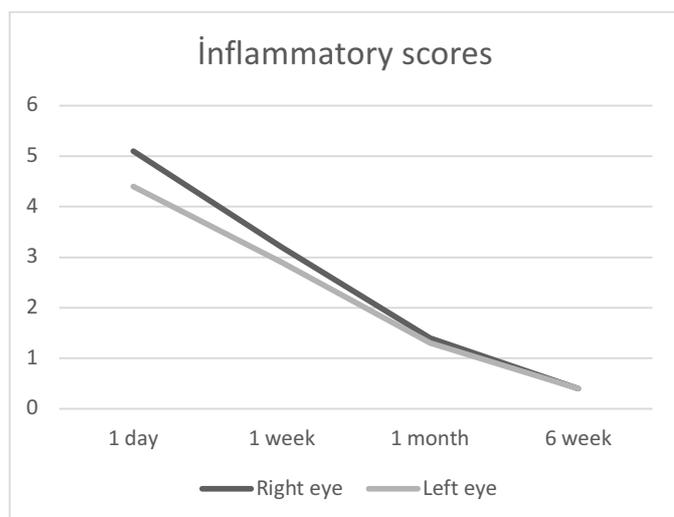
There are a lot of studies about conjunctiva closing with suturation versus fibrin glue [5-14]. These studies had shown although conjunctiva healing process takes a similar time course in both procedure; that the conjunctival inflammation and the severity of pain, tearing and discomfort experienced by patients was significantly less for the fibrin glue group especially



**Fig. 1.** Mean postoperative pain scores at four follow-up periods. \**p* > 0.05



**Fig. 2.** Mean postoperative tearing scores at four follow-up periods \**p* > 0.05



**Fig. 3.** Mean postoperative inflammatory scores at four follow-up periods. \* $p > 0.05$

at the first 24 hours after surgery.

Despite these advantages, fibrin glue could not be used daily in strabismus surgery due to its high cost [12, 15, 16]. And also fibrin glue can be to cause conjunctival retraction [5, 8, 10]. Because of this situation, conjunctival suture with internal knotting can be used for patients' comfort after surgery. This procedure has not statistically significant results, but it can be applied easily and it does not affect the surgery time. Escardo'-Paton and Harrad [17] have shown that the median duration of redness was 9.5 weeks in conjunctiva closed with 6.0 vicryl after adult strabismus surgeries. In other studies have shown that the conjunctival redness persists for an average of 4-5 weeks [3, 5, 11, 12]. The present study found similar results for conjunctival redness in both eyes with 4 weeks. There are no studies in the literature on the internal knotting closure of the conjunctiva. In the present study has been found that the inflammation was lower in the left eyes for the first month.

## CONCLUSION

In surgeries that mostly affect the external appearance of patients, such as strabismus surgery, it is important to close the conjunctiva in terms of both providing a visually pleasing image and postoperative patient comfort. Therefore, it is easy to apply and contributes to postoperative patient comfort; we recommend tying the suture internally while closing the conjunctiva in

strabismus surgery.

### Authors' Contribution

Study Conception: CG, ZH, BG; Study Design: CG, ZH, BG; Supervision: CG, BG; Funding: CG, ZH; Materials: CG, ZH, BG; Data Collection and/or Processing: CG, ZH, BG; Statistical Analysis and/or Data Interpretation: CG, ZH; Literature Review: CG, BG; Manuscript Preparation: CG and Critical Review: CG, ZH, BG.

### Conflict of interest

The authors disclosed no conflict of interest during the preparation or publication of this manuscript.

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