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Research Article

Effect of Subconjunctival Anesthesia on Clinical Outcomes of Conjunctival Flap Surgery in Cases with Infectious Keratitis

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Abstract

Purpose: To evaluate the effect of subconjunctival anesthesia on the outcome of infectious keratitis cases receiving conjunctival flap surgery.

Methods: Patients with infectious keratitis were randomized to receive conjunctival flap with or without subconjunctival anesthesia during operation. The clinical outcome was evaluated through analyzing the recovery time of corneal ulcer, tension of the sutures, and the position and viability of flap assessed with a 4-point rating scale. T-test or regression analysis was performed to compare the outcomes of cases in both groups.

Results: A total of 40 patients were enrolled. The mean recovery time of cases without subconjunctival anesthesia (8.10 ± 4.18 days) was lesser than that of cases with subconjunctival anesthesia (14.18 ± 9.73 days) (P=0.048). The scores of suture tension, flap position, and flap viability of cases without subconjunctival anesthesia (2.50 ± 0.69, 2.95 ± 0.22, 2.50 ± 0.51) were higher than cases with subconjunctival anesthesia (1.74 ± 1.05, 2.26 ± 0.81, 1.90 ± 0.46) (P=0.017, P=0.003, P<0.001 respectively). The ratio of recovery time to ulcer diameter had a positive relation with ulcer diameter in cases with subconjunctival anesthesia with a regression coefficient 0.498 (P=0.006).

Keywords: Subconjunctival Anesthesia; Conjunctival Flap; Keratitis

Introduction

Keratitis is a major cause of ocular morbidity especially in the developing world. Late-stage keratitis not responding to medical management often needs adjunct surgical management such as conjunctival flap covering [1], or amniotic membrane grafting surgery [2]. Conjunctival flap surgery may be useful in cases with keratitis that are not suitable for immediate corneal transplantation, or in settings with insufficient supply o donor corneal tissue [3]. Since the description of conjunctival flap by Gunderson in the late 1950s [4], this technique has been utilized for management of various ocular surface disorders [5,6]. However, different surgeons use personal modifications of surgical technique with regard to mode of anesthesia, suture position and technique.

Cases with infectious keratitis may be associated with hyperalgesia secondary to severe inflammation. In these cases, subconjunctival anesthesia is needed before surgery. In addition, a good coverage and attachment of conjunctival flap onto the cornea surface are essential for the corneal vascularization and healing of corneal epithelium. Since regional anesthesia may be associated with local changes in addition to the physiological effect of anesthetic itself, in this study, we evaluated the effect of subconjunctival anesthesia on the outcome of conjunctival flap surgery in cases with infectious keratitis.

Methods

Patients diagnosed with infectious keratitis and admitted to the Ophthalmology Department of Shandong Provincial Hospital affiliated to Shandong University for conjunctival flap covering surgery were included in this study. The trial was carried out in accordance with the tenets of the Declaration of Helsinki. The study protocol was approved by the ethics committee of Shandong Provincial Hospital affiliated to Shandong University. The treatment was initiated after obtaining an informed consent from patients. One experienced ophthalmologist performed all conjunctival flap surgeries.

A total of 40 eyes of 40 patients were randomly assigned to receive conjunctival flap surgery with (SCA) and without (NSCA) subconjunctival anesthesia. Topical anesthetic drops were applied 3 times at an interval of 2 minutes before surgery. A scalpel was used to remove the epithelium or debris over and 1 mm around the ulcer area. The area was cleaned with a cotton-tipped applicator soaked in 5% povidone iodine. Normal saline was used to rinse the povidone iodine. A conjunctival flap was obtained from a suitable site nearest to the ulcer. Patients in SCA group received subconjunctival injection of 2% lidocaine hydrochloride solution. The conjunctival flap along with the underlying Tenon's capsule was pulled onto the ulcer area. 10-0 interrupted nylon sutures were used to suture the conjunctival flap. Pressure dressing was applied on operated eye after the surgery. Topical anti-fungal or antibiotics were continued after the surgery.

Slit lamp examination was performed before and after surgery until complete recovery or conjunctivalization of ulcer was observed. The area of ulcer was recorded everyday within the first postoperative week and every alternate day thereafter until complete recovery of ulcer. The tension and position of suture, and the position and viability of flap were recorded on day 14 postoperatively. OCT examination was performed before surgery to evaluate the thickness of residual corneal stroma beneath the ulcer area. The suture tension was graded as, grade 0 (all sutures loose or disappear); grade 1 (>50% sutures loose or disappear); grade 2 (<50% sutures loose or disappear) and grade 3 (all sutures in position and in good tension). The position of flap was grade as 0, 1, 2, or 3 according to the exposure area of ulcer: 100% grade 0; <50% grade 1; >50% grade 2, no exposure grade 3. The viability of

flap was graded as 0, 1, 2, or 3: totally pale as grade 0; >50% area pale as grade 1; <50% area pale as grade 2; flap with good blood supply as grade 3. The ratio of the recovery time to ulcer diameter (RU ratio) was calculated.

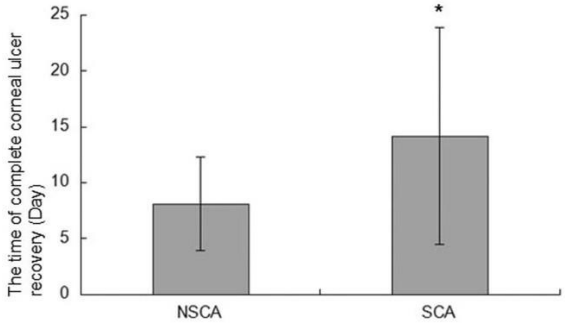
Statistical analysis was performed with Sigma plot (Version 12.5 for windows). T-test was used to compare the clinical outcome of 2 groups. Linear regression analysis was used to evaluate the effect of ulcer diameter and anesthesia on the recovery time and clinical outcome. $P<0.05$ was regarded as statistical significant.

Results

A total of 40 eyes of 40 patients were included (26 males, 14 females mean age, 54 ± 11 years). Thirty-one patients were diagnosed as fungal keratitis and 9 patients were diagnosed as bacterial keratitis. The diameter of corneal ulcer ranged from 2 to 6 mm (average 3.53 ± 1.19mm). Two cases with fungal keratitis and 1 case with bacterial keratitis had an associated hypopyon. Twenty cases received sub-conjunctiva anesthesia during surgery. There was no difference between age, sex, ulcer diameter and residual corneal stroma in both groups.

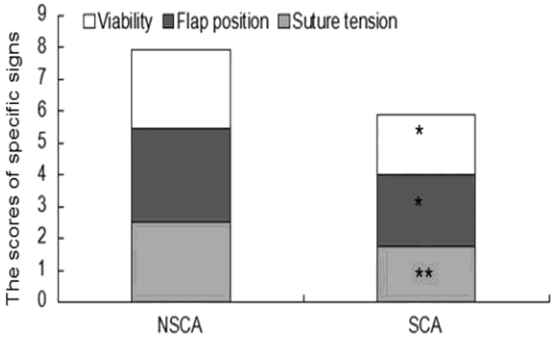
One case with fungal keratitis in SCA group had corneal perforation on day 12, and a conjunctival flap combined with amniotic membrane was applied. Unfortunately, the flap and amniotic membrane were dissolved on day 16 and an eyeball enucleation was then performed. Two cases in SCA group were excluded from the study due to a progressive increase in corneal infiltration on day 7 and day 11 respectively, after initial conjunctival flap surgery. These 3 cases were excluded from the final analysis. The mean recovery time of NSCA group (8.10 ± 4.18 day) was lower than that of SCA group (14.18 ± 9.73 day) ($P=0.048$) (Figure 1). The scores of suture tension, flap position, and flap viability of cases in NSCA group were 2.50 ± 0.69, 2.95 ± 0.22, and 2.50 ± 0.51.

(Figure 1): Mean recovery time of NSCA group (8.10 ± 4.18) was lower than that of SCA group (14.18 ± 9.73).



The scores of suture tension, flap position, and flap viability of SCA were 1.74 ± 1.05, 2.26 ± 0.81, and 1.90 ± 0.46 ($P=0.017$, $P=0.003$, $P<0.001$ respectively) (Figure 2).

(Figure 2): Scores of suture tension, flap position, and flap viability of cases in NSCA group were 2.50 ± 0.69, 2.95 ± 0.22, and 2.50 ± 0.51. Scores of suture tension, flap position, and flap viability of SCA were 1.74 ± 1.05, 2.26 ± 0.81, and 1.90 ± 0.46; * and ** represents for $P<0.05$ and $P<0.001$.



Multiple linear regression analysis revealed a positive relation between recovery time and ulcer diameter, and a negative relation between the subconjunctival anesthesia and recovery time, in an equation: Recovery time (Day) = -17.13+7.36 × anesthesia pattern (NSCA=1, SCA=2) +5.03 × ulcer diameter ($P<0.001$). The RU ratio has positive relation with ulcer diameter in SCA group with a regression coefficient 0.498 ($P=0.006$) but not in NSCA group ($P=0.062$).

Discussion

The microenvironment of pathological cornea is vulnerable and sensitive to the outside environment including PH value [7], and oxygen supply [8]. The subconjunctival anesthesia affects the microenvironment of conjunctival flap which is in direct contact with the ocular surface. Although the effect is temporary, it maybe interfere the growth and regeneration of flap tissue which in turn hinders the attachment between the flap and ulcer surface. This may affect the vascularization of flap and the pathological cornea in the early postoperative period.

The present study observed a higher frequency of suture loosening and flap retraction in cases with subconjunctival injection. A possible explanation is that, the subconjunctival injection leads to an edema of flap, which in turn may induce flap retraction after subsidence of swelling. Inadequate blood supply is another possible reason for the severing of flap. Considering the fact that adequate blood supply is a key point for the recovery of cornea ulcer after conjunctival flap surgery, it is reasonable to observe a better prognosis in cases without subconjunctival anesthesia. Present study also revealed that the subconjunctival anesthesia has a more deleterious effect on the keratitis with larger ulcer diameter, considering the RU ratio has positive relation with ulcer diameter in SCA group ($P<0.001$) but not NSCA group.

Conclusion

The results of our study suggested against the use of subconjunctival anesthesia during conjunctival flap surgery, especially in patients with large corneal ulcer. The main limitations of our study include a small sample size and variable clinical diagnoses. Future studies with are needed to substantiate the results demonstrated in our study.

References

1. Iyer SA, Tuli SS, Wagoner RC (2006) Fungal keratitis: emerging trends and treatment outcomes. Eye Contact Lens; 32(6): 267-271.
2. Fuchsluger T, Tuerkeli E, Westekemper H, et al. (2007) Rate of epithelialisation and re-operations in corneal ulcers treated with amniotic membrane transplantation combined with betulinum toxin-induced ptosis. Gmefes Arch Clin Exp Ophthalmol; 245(7): 955-964.
3. Shi W, Wang T, Xie L, et al. (2010) Risk factors, clinical features, and outcomes of recurrent fungal keratitis after corneal transplantation. Ophthalmology; 117(5): 890-896.
4. Gunderson T (1958) Conjunctival flaps in the treatment of corneal disease with reference to a new technique application. Arch Ophthalmol; 60(5): 880-888.
5. Gundersen T, Pearlson HR (1969) Conjunctival flaps for corneal disease: their usefulness and complications. Trans Am Ophthalmol Soc; 67: 78-95.
6. Khodadoust A, Quinter AP (2003) Microsurgical Approach to the Conjunctival Flap. Arch Ophthalmol; 121(8): 1189-1193.
7. Huang Y, Meek KM (1999) Swelling studies on the cornea and sclera: the effects of pH and ionic strength. Biophys J; 77(3): 1655-1665.
8. Safvati A, Cole N, Hume E, et al. (2009) Mediators of neovascularization and the hypoxic cornea. Curr Eye Res; 34(6): 501-514.