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Comparison of methods of eye protection under general anaesthesia

Purpose: To compare and assess the efficacy of eye ointment and adhesive tape for protection of eyes under general anaesthesia.

Methods: One hundred and fifty patients (300 eyes) undergoing general anaesthesia for > 90 min for non-ophthalmic procedures were divided randomly into three groups (C, T & O). Eyes in group C were left as control, in group T hypoallergen tape was applied and in group O chloromycetin ointment was used. In all eyes basal tear production and visual acuity was assessed and corneal examination was carried out after fluorescein staining both before and after surgery. All the patients were subjected to a conventional general anaesthesia technique.

Results: General anaesthesia reduced basal tear production irrespective of the method of eye protection used ($P < 0.0001$). The overall incidence of corneal epithelial defects was 10%, of which 90% occurred in the control group, 6.6% in the tape and 3.3% in the ointment group. There was no difference between pre and post operative visual acuity (P : NS). Corneal injuries were more common in the dependent eye in the lateral position and the incidence of corneal epithelial defects did not alter with increase in duration of surgery.

Conclusion: During general anaesthesia eyes need protection either by tape or ointment as incidence of corneal injuries is greater in unprotected eyes.

Objectifs : Comparer et évaluer l'efficacité d'un onguent et d'un ruban adhésif pour la protection oculaire pendant une anesthésie générale.

Méthodes : Cent cinquante patients devant subir une anesthésie générale pendant plus de 90 minutes pour une chirurgie non-ophtalmique ont été randomisés en trois groupes (T, R, O). Les yeux des patients du groupe T servaient comme groupe témoin, dans le groupe R on utilisait un ruban hypoallergène et dans le groupe O un onguent de chloromycétine était appliqué. Pour tous les yeux, la production lacrymale basale et l'acuité visuelle étaient évaluées et l'examen de la cornée après coloration avec la fluorescéine était pratiqué à la fois avant et après la chirurgie. Tous les patients ont été soumis à une technique anesthésique générale traditionnelle.

Résultat : L'anesthésie générale a réduit la production lacrymale basale quelle que soit la méthode de protection oculaire utilisée ($P < 0,0001$). L'incidence totale d'atteintes épithéliales cornéennes ont été de 10 %, dont 90% se sont produites dans le groupe témoin, 6,6 % dans le groupe avec ruban adhésif et 3,3 % dans le groupe avec onguent. Il n'y avait pas de différences dans l'acuité visuelle pré et post opératoire. Les blessures cornéennes étaient plus fréquentes du côté de l'oeil déclive en position latérale et l'incidence d'atteintes épithéliales cornéennes n'a pas changé avec l'augmentation de la durée de la chirurgie.

Conclusion : Durant l'anesthésie générale les yeux ont besoin de protection, soit par un ruban adhésif soit par un onguent, car l'incidence des atteintes cornéennes est plus grande chez les patients dont les yeux ne sont pas protégés.

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Accepted for publication on 23 March 1998.

PATIENTS undergoing prolonged non-ocular surgery with general anaesthesia (GA) may develop ocular complications.^{1,2} The factors contributing to these ocular complications are abolition of protective corneal reflex, decreased basal tear production^{3,4} and absence of pain perception.¹

The incidence of corneal epithelial defect during GA has been reported to be 44%⁵ in unprotected eyes and 2.1%⁶ in eyes protected with ointment. The present study was undertaken to compare the efficacy of eye ointment and adhesive tape for eye protection during GA.

Methods

The study was carried out in 150 consecutive ASA I patients (300 eyes) of either sex undergoing GA for 90 min for non ophthalmic surgery. The study was approved by and carried out according to the instructions of the ethics committee of the institute. Patients were divided into three groups of 50 using a randomization chart after obtaining informed consent. Each group was further divided into two equal sub groups.

I. Group IA: (Right eye control, left eye tape)

Group IB: (Left eye control, Right eye tape)

II. Group IIA: (Right eye control, left eye ointment)

Group IIB: (Left eye control, Right eye ointment)

III. Group IIIA: (Right eye tape, left eye ointment)

Group IIIB: (Left eye tape, Right eye ointment)

Best corrected visual acuity was tested with Snellen's or E charts and near vision charts. The Schirmer - 1 test was performed for basal tear production and the cornea was examined, after fluorescein staining.

All the patients received a balanced anaesthesia technique and measures for eye protection were started just after induction and were continued till the end of anaesthesia. One hour after anaesthesia eyes were examined for conjunctival congestion and chemosis. The Schirmer - 1 test was repeated. Corneal epithelial defects were sought by fluorescein staining and, if positive, were repeated after six to eight hours. Visual acuity was tested 24 hr after anaesthesia.

For statistical analysis, analysis of variance, student's t test and the chi² test were applied. For analysis, the eyes under study were regrouped as follows: Control Group © : 100 eyes comprising Right eye of IA, left eye of IB, Right eye of IIA and Left eye of IIB.

Tape Group (T): 100 eyes comprising left eye of IA, Right eye of IB, Right eye IIIA and Left eye of IIIB.

Ointment Group (O): 100 eyes comprising left eye of IIA, Right eye of IIB, Left eye of IIIA and Right eye of IIIB.

Results

Three hundred eyes (150 patients) were observed. There was a difference between the preoperative and post operative basal tear production in all the three groups ($P < 0.0001$) (Table I) but there was no difference in visual acuity for near and distant visions. Of the 300 eyes subjected to fluorescein staining, none of the eyes showed corneal epithelial defect preoperatively. Immediate post-operative examination revealed 30 eyes with corneal epithelial defects: 90% in the control group, 6.6% in the tape and 3.3% in the ointment group. Conjunctival congestion was observed in two eyes.

No correlation could be established between the duration of surgery and incidence of corneal epithelial defects. The number of eyes with corneal epithelial defects are shown according to posture during surgery - supine (S), right lateral (RL), left lateral (LL) in Table II. All six eyes showing corneal epithelial defects in lateral posture were dependent. Of the 33 corneal epithelial defects, 23 were in the lower zone, 10 in the middle and none in the upper zone.

Discussion

Ophthalmic injuries during anaesthesia result from direct trauma or decreased basal tear production due to general anaesthesia.^{2,7} Preoperatively basal tear production was comparable in the three study groups. Basal tear production was reduced postoperatively in all groups compared with the preoperative values ($P < 0.0001$) (Table I). Although basal tear production was reduced in the three groups postoperatively, the maximum reduction was seen in unprotected eyes followed by tape and ointment groups ($P < 0.0008$). Cross *et al.*⁷ demonstrated a decrease in basal tear production during anaesthesia in a study of 16 patients. No difference in basal tear production was observed with increased duration of surgery.

The overall incidence of corneal epithelial defects in our study was 10%. Eyes with multiple corneal epithelial defects occurred only in the control group. This suggests that, during GA, protection of the eyes is mandatory either by tape or ointment. In relation to posture during surgery, all eyes affected in the lateral position were dependent. Therefore, in patients undergoing surgery in the lateral posture, the dependent eye is more prone to develop corneal epithelial defects.

Of the 33 corneal epithelial defects, 23 were noted in the lower zone and 10 in the middle zone.

TABLE I Preoperative and postoperative Schirmer I in three groups

	Control (C)		Tape (T)		Ointment (O)	
	(n = 100)		(n = 100)		(n = 100)	
	Preop	Postop	Preop	Postop	Preop	Postop
Average	17.91	8.89*	16.79	9.73*	16.39	11.43*
SD	7.47	3.94	14.40	4.84	6.36	5.49

*P < 0.0001

TABLE II Incidence of corneal epithelial defects in relation to posture during surgery.

Posture	No of eyes	Eyes with corneal epithelial defects
Supine	248	24 (9.67%)
Right Lateral	26	5 (19.2%)
Left Lateral	26	1 (3.84%)

In another study⁵ of 59 cases, 26 cases developed corneal epithelial defects (44%) and all these epithelial defects were reported in the lower third of the cornea. This predilection of site indicates inadequate lid closure. Our results also indicate that inadequate closure of the lids was the main cause of corneal epithelial defects in control eyes.

There was no difference between preoperative and postoperative visual acuity for both distant and near in any groups. Orlin *et al.*⁸ reported deterioration in visual acuity in 5 of 76 patients after the surgery and they further observed that visual acuity in these five patients returned to baseline within 24 hr. In our study visual acuity was checked 24 hr postoperatively and no change between preoperative and postoperative values was noted in any of the groups.

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