

Corneal 'Dellen' as a complication of strabismus surgery

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CLINICAL STUDY

Abstract

Purpose This paper presents results of an analysis on patients operated on for strabismus in order to evaluate frequency and clinical characteristics of corneal alterations. In our experience, this kind of complication occurs more frequently after reoperation and/or after surgery for esotropia in sixth nerve palsy using transposition procedures.

Methods A retrospective analysis was made of 655 consecutive patients operated on for strabismus on the recti muscles with a limbal approach from January 2001 to July 2003 (30 months).

Results We found 30 corneal dellen out of the 184 eyes (16.30%) reoperated on medial rectus muscles, 7 corneal dellen out of the 37 eyes (18.92%) operated on using transposition procedures, 4 corneal dellen out of the 101 eyes (3.96%) operated of lateral rectus muscle recession combined with medial rectus muscle resection and no corneal dellen in the other 976 eyes operated of using different surgical procedures on the recti muscles. All patients had been operated on using a conjunctival limbal approach. All corneal dellen disappeared in about 10–15 days, using topical antibiotics and a firm bandage applied to the eye at night, leaving permanent alterations in corneal homogeneity in 8 eyes (19.51%).

Conclusion This study showed that this kind of complication is relatively frequent after reoperations and/or transposition procedures, thus indicating that it is possible to identify surgical procedures which might play a role in the development of corneal dellen. Therefore, the post-operative monitoring of patients at risk should not be delayed for more than one week, in order to avoid possible corneal perforation.

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Introduction

Dellen were first described in 1911 as saucer-like excavations of the corneal margin. They are caused by interruptions of the tear film and local dehydration of the cornea. This generally benign complication of strabismus surgery—not to be confused with marginal corneal ulcers—occurs especially when a limbal incision is used, and the build-up caused by damaged limbus tissue reduces both the eyelid wiping and the tear film spreading abilities. Dellen usually respond well to a firm bandage applied to the eye for 24–48 h. They can be prevented by the smooth closure of the limbal wound and the resection of excess conjunctiva to avoid tissue build-up near the limbus.¹ Untreated, dellen can cause corneal perforation.

To our knowledge, there are few reports on the frequency of postoperative dellen after strabismus surgery.^{2–4} Furthermore, these reports have only taken into account the role of the conjunctival approach, that is limbal *vs* non-limbal, for horizontal rectus muscle surgery. The type of surgical procedure has never been taken into account.

In our clinical experience, dellen occur more frequently after reoperation and/or following transposition procedures for esotropia in sixth nerve palsy. Oblique muscle surgery is never associated with corneal complications, probably because the surgical approach is not close to the cornea and perhaps also because only rectus muscle vessels are involved with anterior segment vascularization. This paper presents the results of a survey of patients who underwent surgery for strabismus, the purpose being to evaluate the frequency and clinical characteristics of corneal alterations.

Materials and methods

Possible postoperative corneal complications after strabismus surgery were investigated. A retrospective analysis of the files of 875 private patients who underwent strabismus surgery

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between January 2001 and July 2003, kept by one of the authors (ECC), was made. Among them, 655 had undergone strabismus surgery on the rectus muscles with a conjunctival limbal approach, for a total of 1298 operated eyes. Of the 655 operated patients, 331 were women and 324 men, all aged between 17 and 67 years (mean age 42 years).

According to the type of surgery performed on the rectus muscles, we broke the patients into the following 7 groups.

- Group 1. Medial rectus muscle recession: 872 eyes
- Group 2. Lateral rectus muscle recession: 95 eyes
- Group 3. Lateral rectus muscle recession combined with medial rectus muscle resection: 101 eyes
- Group 4. Lateral rectus muscle tucking: 5 eyes
- Group 5. Inferior rectus muscle recession: 4 eyes
- Group 6. Advancement of a previously recessed medial rectus muscle: 184 eyes
- Group 7. Medial rectus muscle recession with a modified Jensen transposition procedure: 37 eyes.

All patients underwent surgery with a conjunctival limbal approach, not buried absorbable sutures were used to close the conjunctiva. During surgery, the cornea was protected using irrigation with fluid, drops (antibiotics) were instilled at the end of surgery and the eye was left open. The patients were followed up the day after and 7, 15, and 21 days after surgery. At the first follow-up, a combination of topical steroids and antibiotics (1–2 drops, 4 times a day, for 1 week) was prescribed to all patients.

At the second follow-up, patients were examined with a slit lamp and topical steroids were discontinued for those with corneal dellen and replaced with topical non-steroid anti-inflammatory drugs (1–2 drops, 4 times a day, for the first week, and 1–2 drops 3, times a day, for the second week), in combination with topical antibiotics (1–2 drops, 4 times a day, for the first week and 1–2 drops, 3 times a day, for the second week). A firm bandage was applied to the eye for the following 7 nights and an antibiotic ointment was also prescribed.

Patients with no corneal complications were kept on the topical steroid/antibiotic combination for 7 more days (1–2 drops, 3 times a day).

Dellen were graded as epithelial and stromal, according to severity and fluorescent staining.

A statistical analysis was performed. The 95% confidence interval of patients with corneal complications was calculated using the method recommended by Newcombe and Altman^{5,6} for each group.

Results

Corneal dellen were found in 41 eyes and occurred in the postoperative phase of extraocular muscle surgery.

Table 1 Proportion of complications depending on the surgical treatment

Type of Intervention	Proportion of patients with corneal dellen (%)	95% CI
Group 1 (n = 872)	0	0–0.4
Group 2 (n = 95)	0	0–3.81
Group 3 (n = 101)	3.96	1.6–9.7
Group 4 (n = 5)	0	0–43.4
Group 5 (n = 4)	0	0–49.0
Group 6 (n = 184)	16.30	11.7–22.3
Group 7 (n = 37)	18.92	9.5–34.2

No corneal dellen were found in groups 1, 2, 4, and 5.

In Group 3, we found corneal dellen in 4 out of the 101 eyes (3.96%) with lateral rectus muscle recession combined with medial rectus muscle resection. In each eye, the corneal dellen were near the site of the nasal limbal conjunctival incision.

In Group 6, we found corneal dellen in 30 out of the 184 eyes (16.30%) with a reoperation on a medial rectus muscle. In each eye, the corneal dellen were near the site of the nasal limbal conjunctival incision.

In Group 7, corneal dellen were found in 7 out of the 37 eyes (18.92%) where a transposition procedure was used. In six cases the corneal dellen were near the temporal limbal conjunctival incision and in one case near the nasal limbal conjunctival incision.

Dellen percentages make it possible to calculate a 95% confidence interval, that is, the interval of values including the proportion of corneal complications for each type of surgery considered, with a 5% margin of error (see Table 1).

In all the cases, dellen were detected by slit-lamp examination at the second follow-up (7 days after surgery). In 33 of the 41 eyes (80.48%), there were epithelial dellen which healed completely with no permanent corneal alterations. Mild leucomas appeared within the 15th and the 21st week of follow-up in 8 of the 41 eyes (19.51%). After one year only 1 of the 41 operated eyes showed a corneal scar resulting from a dellen (2.43%).

Discussion

In conclusion, a high percentage of corneal dellen was found in eyes that underwent reoperation on medial rectus muscles (16.30%) or transposition procedures (18.92%). A conjunctival limbal approach was always used. All corneal dellen healed in about 10–15 days using topical antibiotics and a firm bandage applied to the eye at night (for 7 nights). In each case, topical steroids were suspended and were replaced with topical non-steroid anti-inflammatory drugs.

The frequency of complications was not statistically related to age or sex. All patients with corneal dellen showed a marked elevation of the oedematous conjunctiva caused by tissue damage at the limbus, which seems to confirm that dellen are induced by corneal desiccation.¹ The study confirmed that this kind of complication is relatively frequent after reoperations and/or transposition procedures, thus indicating that it is possible to identify surgical procedures which might play a role in the development of corneal dellen. Though there are no ways for preventing this complication, the rational approach is early detection and an appropriate medical treatment. Therefore, the post-operative monitoring of patients at risk should not be delayed for more than one week, to avoid possible corneal perforation and perhaps other extremely serious corneal or scleral complications.⁷ Obviously, the different percentages of post-operative corneal complications (dellen) with the different surgical procedures have no bearing on pre-operative indications. The awareness of the possibility of dellen development simply suggests a close post-operative follow-up of the cornea.

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