Outcome following surgery for contact lens induced ptosis

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ABSTRACT

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Purpose: To assess the outcome of surgery in patients with a history of contact lens wear

Design: Retrospective, comparative interventional case series.

Methods: A total of 419 patients underwent ptosis surgery during a one year period 2005-2006 at Moorfields Eye Hospital. Those included in this study had a diagnosis of aponeurotic ptosis and history of contact lens wear.

Main Outcome Measures: Outcome was considered a success if the following criteria were met (1) margin reflex distance between 3 and 5mm, (2) inter-lid difference was 1mm or less (3) absence of redo surgery.

Results: Thirty patients (7.2%) were identified with a history of contact lens wear and were matched against a control group of forty-six patients. The mean margin-reflex distance at presentation was 0.5±2.4 mm. This equated to a ptosis graded as mild 32% (≥1.5mm), moderate 29% (0.5-1.0mm) and severe 39% (≤0.0mm), with similar proportions in the control group (36% mild, 39% moderate and 25% severe). The power of the refractive correction (P<0.005) and the age of the patient (P<0.05) were directly related to increased severity of ptosis at presentation. The surgical outcome of the ptosis correction was successful in 72% of patients which was significantly lower than in the control group (89%, P<0.005).

Conclusions: The severity of contact lens related ptosis was related to the degree of myopia and the age of the patient but not to the duration of contact lens wear. There was a higher level of failure and requirement for redo surgery in patients with contact lens related ptosis compared to matched controls.
Precis:

There is an association of hard contact lens use and acquired involutional ptosis, in this study we found the severity of contact lens-related ptosis was related to the degree of myopia and patient age but not duration of wear.
Aponeurotic blepharoptosis results from a combination of thinning and possible disinsertion of the levator aponeurosis, resulting in a characteristic high skin crease with good levator function.\textsuperscript{1-3} Hard contact lens wear has been identified as a risk factor for acquired aponeurotic ptosis in addition to involutional and other causes.\textsuperscript{4}

Previous studies have highlighted the association of hard contact lens use and acquired involutional ptosis although the exact mechanism remains unknown. The repeated insertion and removal of contact lenses has been said to mechanically damage the upper lid retractor mechanism with resulting ptosis.\textsuperscript{4-6} Although studies have evaluated features of ptosis with a history of contact lens wear, there is a paucity of information on results following surgical correction.

In this study, we evaluated the outcome of ptosis surgery in patients with a past history of contact lens wear. To further investigate the surgical outcome, the results were compared with a matched control group who underwent surgery for involutional ptosis without a history of contact lens wear.

\textbf{Material and Methods}

\textbf{Study Design}

The criteria for inclusion in this study included (1) a diagnosis of aponeurotic ptosis, (2) history of contact lens wear (3) surgical correction by standardized anterior approach levator aponeurosis advancement (4) surgery performed by an oculoplastics specialist at Moorfields Eye Hospital. Exclusion criteria included previous surgery on the eyelids, concomitant surgery performed at the time of ptosis repair e.g. blepharoplasty, concurrent ocular or systemic condition that might influence eyelid height e.g. thyroid eye disease.
A total of 419 patients underwent ptosis surgery during a one year period from 2005-2006 at Moorfields Eye Hospital. Of these, thirty cases (7.2%) were identified with a history of contact lens wear and were included in this retrospective case series. Seven patients who had undergone previous intraocular surgery were excluded from the analysis, including three patients who wore contact lenses following penetrating keratoplasty for keratoconous, two patients with contact lenses for aphakia and two patients with cosmetic contact lenses in blind non-functional eyes.

**Outcome measures**

Outcome was considered a success if the following criteria were met (1) a margin reflex distance between 3 and 5mm, (2) inter-lid difference was 1mm or less and (3) an absence of redo surgery.

**Patients**

The average age of the patients was 52 ±13 years respectively, with a range of 26 to 74 years. Eighteen of the 23 patients were female (78%) and five were male (22%). Fifteen cases (65%) were unilateral (11 right and 4 left) and 8 (35%) bilateral. The demographic information is summarised in Table 1.

All patients were questioned regarding the use of their contact lenses including duration of wear, time per day, type of contact lenses and other ocular or medical conditions. Examination included palpebral fissure height, margin reflex distance, levator function, position of the eyelid in downgaze, skin crease, fatigue, ocular movements and manual elevation of the more affected lid to evaluate the presence of contralateral ptosis.
Slit lamp biomicroscopy included evaluation of the cornea for keratopathy and eversion of the eyelid for papillae.

Ptosis was defined by a margin reflex distance of ≤2.5 mm margin-reflex distance or ≥2 mm of eyelid asymmetry. Aponeurotic ptosis (whether involutional or with a history of contact lens wear) was diagnosed by characteristics of reduced margin-reflex distance, raised or absent skin crease, deep sulcus, normal ocular movements and levator function. Failure of surgical correction was defined as undercorrection with residual ptosis. For the purpose of data analysis, the patients were divided into 3 groups based on the severity of ptosis; mild (margin reflex distance of ≥1.5 mm), moderate (0.5 -1.0 mm) and severe (≤0.0 mm).

**Surgical Technique**

The patients at Moorfields Eye hospital underwent surgical correction by a previously reported anterior approach levator aponeurosis advancement. After informed consent was obtained, the lid crease was marked with the patient in the supine position. An equal mixture of 1-2 mL of 2.0% lidocaine with epinephrine 1:100 000 and 0.75% bupivicaine were injected. The surgical technique adopted involved a lid crease incision approximately 20 mm long. The tarsus was identified, the dissection continued superiorly and the orbital septum opened to expose the orbital fat and aponeurosis. The upper two thirds of the tarsal plate were cleared by dissection under the orbicularis oculi muscle and the aponeurosis resected or advanced and sutured to the tarsal plate. All procedures used three 6-0 long-acting absorbable sutures (Vicryl®, polyglactin 910). The skin crease was reformed and skin closed with 6-0 absorbable suture; At the conclusion of surgery
patients were given 1.0% chloramphenicol ointment and a pressure patch was applied. The patch was removed on the first day after surgery and 0.5% chloramphenicol drops and lubricants administered 4 times daily for 2 weeks. Patients were reviewed at one week for removal of sutures then, 6 weeks, 6 months and 1 year. All measurements were taken at the patient’s last out-patient appointment at 1 year.

Population-based controls
From the total 419 patients who underwent ptosis surgery a random selection of 50 patients with involutional ptosis were selected as controls. The identical inclusion and exclusion criteria were adhered to except for the past history of contact lens wear. All 46 patients had a diagnosis of involutional ptosis and underwent surgical correction during the one year period 2005-2006 at Moorfields Eye Hospital, four patients were excluded with inadequate post-operative data. The details of the control group are shown in Table 1.

Statistical methods
This candidate pool of possible risk factors considered in the building of regression models comprised demographic factors, lens type, wear schedule, lens wear experience, duration of wear, refraction, and visual acuity. Where appropriate, chi-square tests for comparing proportions, and t tests for comparison of means, were used. A level of P<0.05 was accepted as statistically significant and analysis completed using SPSS 10.0. (SPSS software for Windows, version 13, Chicago, IL).
Results

A summary of the results is shown in Table 2.

Contact lens wear

The majority of the patients wore rigid contact lenses; 13 gas-permeable (GP), 2 polymethylmethacrylate (PMMA) and 2 both GP and PMMA lenses. Four patients were currently using soft contact lenses, one had previously used GP lenses and in 2 patients the type of contact lenses worn was unknown. The majority of patients had worn a number of different contact lenses in the past including PMMA, gas permeable, silicone hydrogels and hydrogels. The duration of contact lens wear was 25±5 years with an average of 13.8±1.6 hours of contact lens wear per day.

Severity of ptosis

The margin-reflex distance at presentation was 0.5±2.4 mm. This equated to a ptosis graded as mild 32% (≥1.5mm), moderate 29% (0.5-1.0mm) and severe 39% (≤0.0mm) grade ptosis, with similar proportions in the control group (36% mild, 39% moderate and 25% severe). The mean levator function was 14.8±2.0mm and skin crease was 10.9±2.5mm. Multiple regression was used to evaluate associations between demographics, contact lens history and examination measurements relative to the severity of ptosis at presentation. The power of the refractive correction (P<0.005) and the age of the patient (P<0.05) were correlated with increased severity of ptosis at presentation. No correlation was found with duration of contact lens wear, postoperative margin-reflex distance or skin crease.
**Surgical Outcome**

The results of the ptosis correction were recorded at the last out-patient appointment at approximately one year. The outcome was successful in 66% to 72% depending on which of the three surgical outcome measures (66% of the margin reflex distance 3-5mm, 70% of the inter-margin reflex distance ≤1mm and 72% did not require redo surgery). The surgical outcome was statistically different to the control group that was successful in 78% to 89% depending on the outcome measure (P<0.005) (Table 2). Sixteen percent of patients in the contact lens group required lubricants for the management of corneal erosions in the follow-up period and had not restarted contact lens wear (The number of patients with corneal erosions in the control group was not available).

**Discussion**

Although previous studies have evaluated the association of hard contact lens wear and ptosis, the information on outcome has remained scarce. This study evaluated the outcome following surgical correction by comparison with a matched control group. Confounding factors including trauma, past eyelid surgery and concurrent ocular or systemic conditions were excluded.

The criteria for successful lid surgery following ptosis surgery have differed. Frueh et al summarised the results for correction of aponeurotic ptosis and proposed that a 1.0mm difference in lid height above the centre of the pupil was an acceptable definition for a successful operation, 76 to 96% of the studies met this criteria. In this
study 70% of the contact lens group, compared to 89% of the control group were deemed success. Other studies have focused on redo surgery as an objective measure of success. They recognize that a proportion of unsatisfactory results may not undergo further surgery and have reported redo rates from 8.7 to 31%. This study identified a higher level of redo surgery (28%) in the contact lens group compared to the control group (11%) (P<0.005).

Previous publications have reported an association between contact lens use and involutional ptosis. Although the mechanism is unknown, it has been hypothesised that the chronic manipulation of the eyelids with hard contact lenses insertion and removal induce aponeurotic disinsertion. This study found that increased strength of refractive correction and the age of the patient, (not duration of contact lens wear) were associated with increased severity of ptosis at presentation. The association of increased severity of ptosis with age, is consistent with the mechanical hypothesis for aetiology of contact lens induced ptosis. In addition our findings suggest that high myopia may predispose to further damage to the upper lid retractor mechanism resulting in increased ptosis. Hypothetic mechanisms include; with increasing myopia, a relative increase in globe size and longer aponeurosis, which may result in additional stretching of the levator with mechanical insertion and removal of the contact lens. In addition, the increased size of the contact lens for higher myopic correction may have greater traumatic effects on damaging the levator aponeurosis. However there was no association with years of contact lens wear and a pure mechanical aetiology does not explain why some patients do not develop contact lens related ptosis.
Although the exact mechanism of ptosis in patients with a history of contact lens wear in not known, this study identified a lower success rate following standardized anterior approach levator aponeurosis advancement. We postulate that if mechanical insertion and removal of contact lenses can be attributed to causation, then the implication is that either the increased failure rate is a result of chronic injury to the lid elevating apparatus, despite normal levator function, or the result of recurrent injury as a consequence of further contact lens wear. Watanabe et al identified fatty degeneration and fibrosis of the aponeurosis and Mueller muscle that was more consistent with a chronic inflammatory change in patients that underwent surgical correction of contact lens induced ptosis, and suggested that aponeurotic dehiscence was inadequate to explain all the histopathological findings.\textsuperscript{11} Chronic inflammatory and structural changes in the lid elevating complex may have implication to the increased failure rate following corrective ptosis surgery. Post-operatively patients were allowed to recommence contact lens wear two weeks post-surgery provided there were no complications or eyelid asymmetry. Two thirds of the patients that required redo surgery failed within the three month post-operative period. In this retrospective study it was not possible to identify if resumption of contact lens wear was a risk factor for ptosis recurrence.

Our study is limited by the shortcomings inherent to a retrospective review. The majority of patients had a long-history of contact lens wear, during this period they had used more than one contact lens and varied their pattern of use. In addition patients were identified by their requirement for surgical correction which represents a selection bias excluding mild cases that did not require surgical intervention. This study identified a history of contact lens wear in 7\% of the patients undergoing ptosis repair, compared to a
range of 17 to 47% in other studies with different selection criteria, Table 3. This is the first study to evaluate the surgical outcome of ptosis in patients with a history of contact lens wear and found a higher failure rate and requirement for redo surgery in the contact lens group compared to the matched control group.
Legends

Table 1 Demographics of ptosis in patients with a history of contact lens wear and the control involutional ptosis group

Table 2 Clinical findings of ptosis in patients with a history of contact lens wear and the control involutional ptosis group

Table 3 Studies of contact lens related ptosis
References


