

The Non-Dry «Dry Eye» Complex

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The characteristic feature of the non-dry «dry eye» complex is a discrepancy: the patient complains about dry eyes, and the doctor observes «wet» eyes. In other words, symptoms and signs oppose each other diametrically.

The reason for this paradox is the response of the sensory nerves belonging to the protective system of the external eye: The conjunctiva, the lid margins and the lashes. These seem to be perceived as an entity and wherever this protective entity is stimulated the sensation is localized «at the eye». The signal transmitted by these nerves is always a tactile sensation, and whatever the cause of their stimulation, the sensation is «foreign bodies». The general response signals «danger!»

An ambiguous interpretation of the patient's words by the doctor may lead to an erroneous diagnosis of «dry eye» (Box 1).

Example of a dialogue which may lead to the assumption of dry eyes

Patient: «I feel...eh... it is like something in my eye...»
 Doctor: «Did a grain actually fall into your eye?»
 Patient: «No, no...»
 Doctor: «Then, does it feel like sand in your eyes?»
 Patient: «Rather...yes, but maybe...»
 Doctor: «Does it make you feel like rubbing your eyes?»
 Patient: «yes....»
 Doctor: (to himself): «AHA!!! Dry Eye!»
 (to the patient): «Hmm, apply these drops ... and call again»

Mainly, there are four syndromes within the complex to be discussed:

1. The lid margin touch syndrome, in which the stimulation is produced by long hair from the eye brows touching the lid margin
2. The conjunctival laxity syndrome, in which the stimulation of the nerves derives from folding and unfolding movements of conjunctival surplus tissue

The text is based on a lecture, given at the Swiss «Ophthalmic Winter Seminar 2005» at the request of the scientific committee. The committee asked for a retrospective, more than a decade after my retirement from professional activities. My title was «Looking Back at Non-Accomplishments», and I chose subjects with clinical significance in daily ophthalmologic practice with the intention of inciting my younger colleagues to accomplish the tasks in the future. My choice was driven by the remark of one of my former residents who answered to the question how his professional life was doing: «All day long oldies who can't read and lots of other oldies who complain about dry eyes, get drops, come back still with dry eyes, get other drops, come back... and so on.....». My accomplishments in external eye diseases presented here are the defini-

tion and analysis of the diseases and the suggestion of a therapeutic approach. My non-accomplishments are the lack of statistics about the incidence of those conditions and about the results of treatment. The number of patients I saw was too small, because «simple» cases are very rarely shown to a professor at an University Eye Hospital. If I came across them it was merely by coincidence. The retrospective showed my non-accomplishments, being the lack of answers to the following questions: How many patients with signs have symptoms? Who needs therapy? What are the advantages and disadvantages of different treatments? Finding the answers will remain a challenge for my still active colleagues. The following article doesn't focus on non-accomplishments, but outlines a practical problem which should gain more vigilance.

3. The cilia touch syndrome, with an irritation of the lashes by dropping lid skin
4. Fibrin in the conjunctival space, where the stimulation derives from fibrin attachments being irritated during eye movements.

1. The Lid Margin Touch Syndrome

An eyebrow hair long enough to touch the lid margin – is this phenomenon not to banal to be worth mentioning? There are two reasons to describe the lid margin touch syndrome as a clinical entity: *First:* Lid margin touch proves the hypothesis that an extraconjunctival stimulus may be interpreted as conjunctival dryness. My first – and only – patient with this syndrome is myself (Fig. 1). When the first symptoms of dry eye appeared I thought: Well, old age, now it's my turn.... But then I discovered the offending hair and with a snip of scissors I was cured. This is how I realized that foreign bodies don't have to be present in the conjunctival space to be perceived as such.

Clinical significance of Lid Margin Touch

- Confirmation of the hypothesis that a non-dry «dry eyes» syndrome exists
- danger of missing the diagnosis

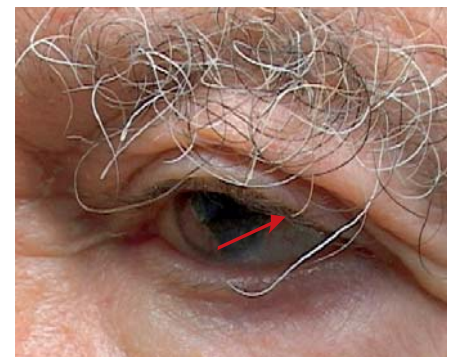


Fig. 1 Lid Margin Touch

The offending hair from the eye brow (arrow) is in contact with the lid margin just between the lashes. Note: There is no direct contact with the conjunctiva despite conjunctival foreign body sensation.

Second: The diagnosis is easily missed. This may happen especially when a patient is already seated at the slit lamp when he is examined at his first visit. Imagine what happens to your reputation when you treated a patient with eye drops for years, and then this patient is seen by another ophthalmologist, who – pluck! – heals him within a second. In conclusion: the syndrome may appear insignificant, but if you miss it....

2. The Conjunctival Laxity Syndrome

Etiology. In older age the subconjunctival fibres lose their elasticity, similarly to facial skin. As a result, folds appear which change their configuration at every eye movement. The shifting of the folds may irritate the nerve receptors and produce the tactile sensation of multiple grains.

Characteristics of Conjunctival Laxity

- Loss of subconjunctival elasticity
- Superfluous superficial conjunctival tissue
- Folds changing their shape with every eye movement
- Shifting of folds following gravity (in contrast to chemosis)
- Deviation of tear flow

Clinical appearance. The folds are extremely mobile. They may accumulate along the lower lid margin and deviate the tear flow (Fig. 2). If they obstruct the access to the lower punctum (Fig. 3) the result is an overflow of tears – despite

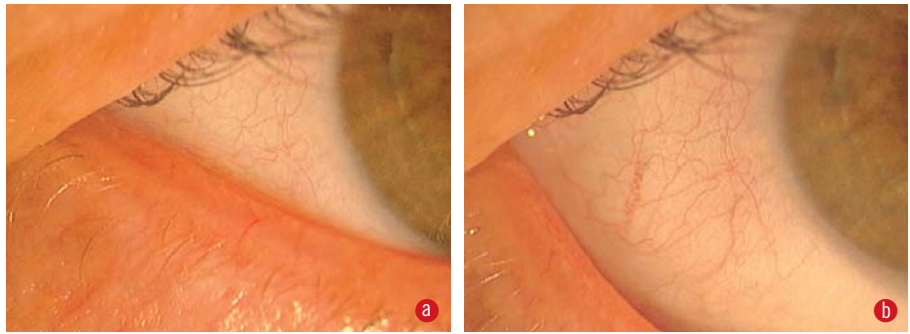


Fig. 4 Reaction to Gravity:

- a Conjunctival folds at normal lid position
- b Flattening of the conjunctiva after retraction of the lid, the folds having descended towards the fornix

the symptoms of a dry eye! Due to their mobility, on retraction of the lower lid the folds follow gravity (Fig. 4) and descend towards the lower fornix.

Therapy. Viscous eye drops – the classical therapy for dry eyes – are supposed to facilitate gliding and thus to alleviate the symptoms, but they may have the opposite effect. They increase the capillary attraction between the surfaces of the folds as well as between the globe and the tarsus, and may «glue» them to-

gether. While this might reduce the irritation of the nerve receptors temporarily, the laxity will worsen due to the overstretch and rupture of the subconjunctival fibres (Fig. 5).

Goals of Surgery for Conjunctival Laxity

- Stretching the folds
- Reduction of conjunctival tissue
- Fixation at the fornix

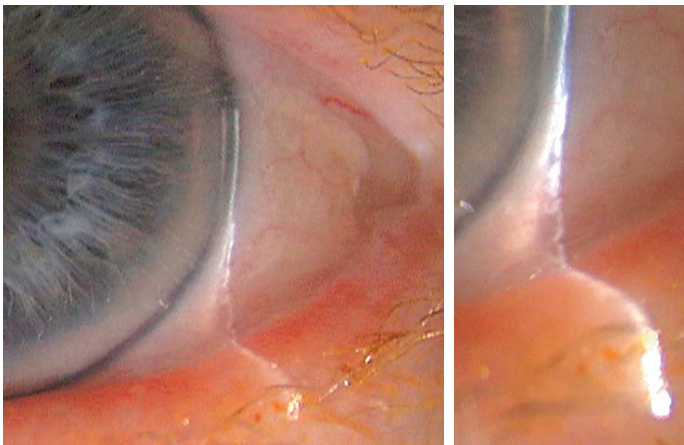


Fig. 2 Folds along the Inner Rim of the Lower Lid:

Optical section shows the folded flaccid conjunctiva in profile.

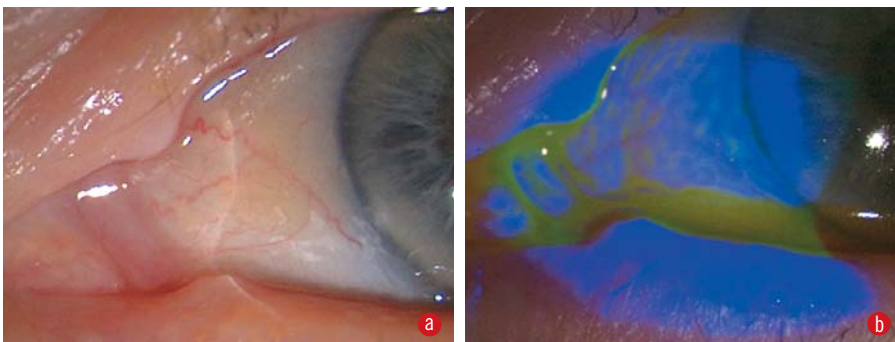


Fig. 3 Fold Obstructing the Access to the Lower Punctum

- a Optical section shows the overlap of the conjunctiva upon the punctum
- b The resulting accumulation of tears causes a wet eye despite dry eye symptoms

The treatment directed at the etiology is surgery with goals similar to those of a face lift. As a tentative treatment I performed an excision of rhomboids in the lower oblique quadrants of the conjunctiva (Fig. 6). In my few cases the results were almost «Kitsch»¹: The patients were relieved of their longstanding annoying symptoms within a couple of days. But I can't offer a sufficient follow up to determine how long the success lasts, how often the procedure has to be repeated (similar to face lifts), and whether other types of surgery would have yielded better results. Certainly it is worthwhile to investigate surgery as a means to help our numerous old age patients to get rid of their eye drops which are useless in this condition.

However, a non-medical side effect has to be considered: A large increase in surgical procedures will have an impact on the policies of health insurances.

¹ I call «Kitsch» the frequently heard stories, told at parties, at intermissions between conferences and sometimes even from the pulpit: «.... The patient had seen dozens and dozens of doctors, tried hundreds of classical and alternative medicines..... and then finally (and luckily) he came to ME!.... aaaaaand WOW!»

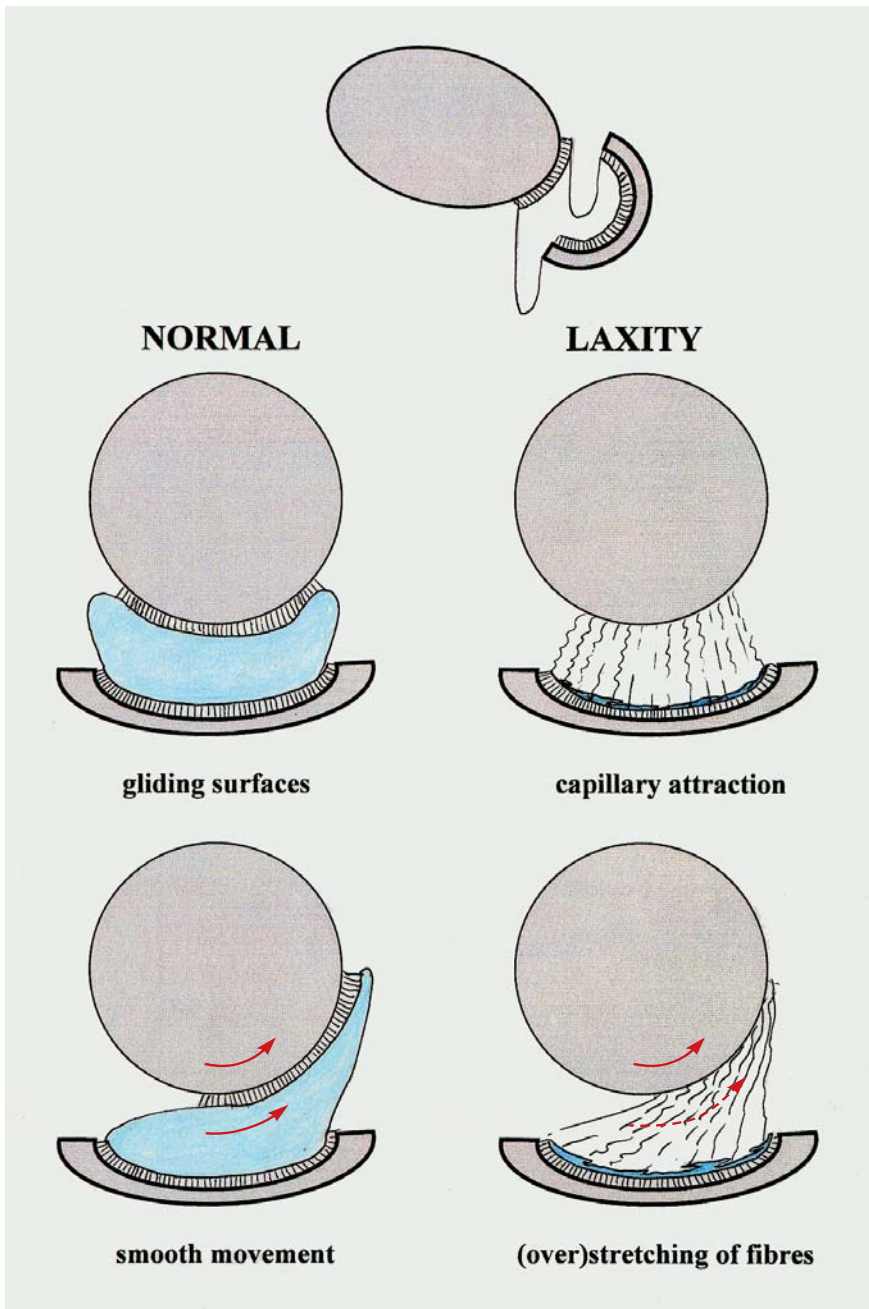


Fig. 5 Side Effects of Viscous Eye Drops:

Top: Horizontal cross section trough globe and lower lid, as used on the following drawings
 Left: Normal conjunctiva. Bulbar and palpebral conjunctiva are separated by a free gliding space (above). On movements both shift smoothly against each other (below).
 Right: Conjunctival laxity. The surfaces of the opposing conjunctival surfaces are glued together by capillary attraction (above). Shifting movements expose the subconjunctival fibres to stress (below)

3. The Cilia Touch Syndrome

Etiology. The tactile sensations are provoked by a fold of dropping lid skin touching the lashes (Fig.7). Since the nerve sensations don't localize precisely the place of origin they are linked to the impression «multiple foreign bodies in the conjunctiva».

Indirect Signs of Cilia Touch

- Attempts to keep gazing downwards without neurological signs
- Frowning and elevation of the brows without the presence of ptosis
- Defensive reclining of the head
- Excessive blinking, simulating mild blepharospasm

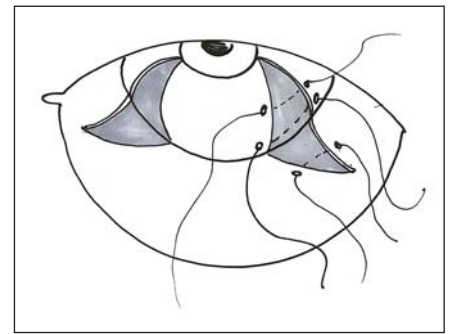


Fig. 6 Surgical Reduction of Laxity:

Excision of a rhomboid in the inferior oblique quadrants with the upper apex close to the limbus and the lower apex at the inferior border of the tarsus. The widest diameter is at the fornix. The sutures are buried deeply in order to create tension, and a kind of fixation at the fornix.

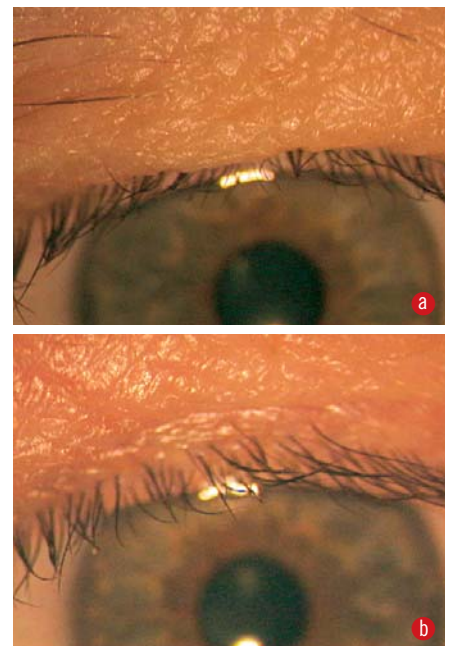


Fig. 7 Monolateral Cilia Touch

- a Right eye with lid skin touching the cilia.
- b Left eye with normal lid position.

Clinical appearance. Many persons with excessive lid skin show contact with cilia but lack any symptoms. Those with tactile sensations try to bring the cilia out of reach of the skin fold and present themselves with corresponding signs (Box 5): Gazing downward whenever possible, respectively lifting the front skin, or reclining the head when looking straight ahead. If the patient doesn't succeed in avoiding contact, he may blink

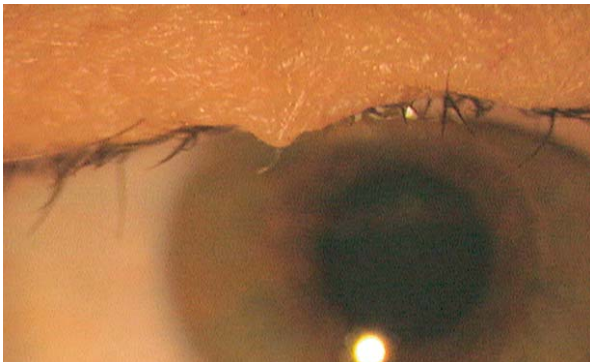


Fig. 8 Pseudoblepharospasm:
The lashes are buried deeply under overlapping lid skin.

to a degree arousing suspicion of mild blepharospasm (Fig. 8).
Lifting and fixation of the lid with adhesive tape relieve the symptoms immediately (= diagnostic test).

Therapy. Surgical removal of excessive lid skin is the obvious solution. In my few patients the success was very impressive. But here, too, the consequences for health politics have to be considered. Blepharoplasty is sought by thousands for cosmetic reasons. This indication usually is not covered by health insurances. However for the cure of «dry eyes» the surgical procedure would be a medically indicated measure – and then be covered by social health plans. It is easy to imagine the sequelae if all «cosmetically motivated» persons learn that they can turn into sick = insurance covered patients merely by pretending sensations of dryness.

4. Fibrin in the Conjunctival Space

Etiology. Fibrin, frequently associated with conjunctival inflammation, alters the properties of the ocular and inner palpebral surfaces and causes friction if these surfaces rub against each other. Sensory input from the conjunctiva will provoke tactile sensation (and from the cornea even pain). Measures directed against fibrin accumulation alleviate the most unpleasant symptoms during inflammations of the external eye.

Treatment Goals against Fibrin

- Preventing fibrin formation
- Dissolve existing fibrin
- Protect the surfaces against adhesion of fibrin

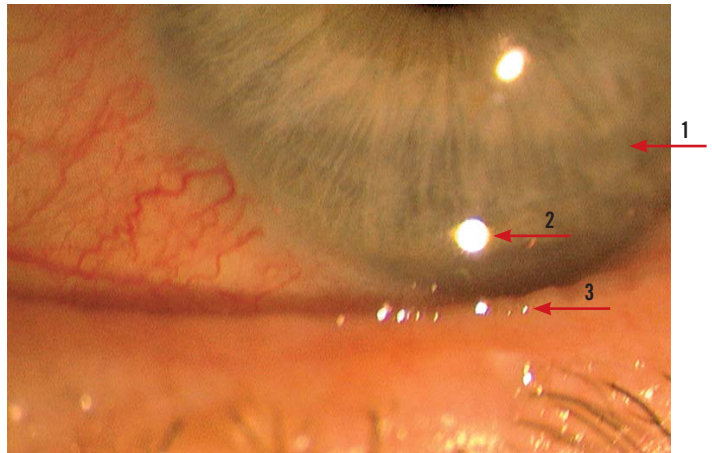


Fig. 9 Fibrin in the Conjunctival Sac
Signs of a viscous tear film at lower lid margin: The level of the tear film (perceived here just as a change of hue of the iris, arrow 1) is elevated, there is a reflex at the tear surface far above the lid margin (2), and on the lid margin the reflex of the tear film is advanced and reaches to the middle of the rim (arrow 3).

Clinical appearance. Fibrin is easily detected if it accumulates as conspicuous strands in the conjunctival sac. But if there are no such strands its diagnosis is easily missed.

The manifestations of inconspicuous fibrin are an enhanced viscosity of the tears, and the formation of thin layers over tissue surfaces.

The first sign, the high viscosity, can be recognized by the shape of the tear film which is amplified. This is the case when the upper border is located far above the inner lid margin, and when the reflexes are elevated and advanced (Fig. 9). At very high viscosity the tear film may be even convex instead

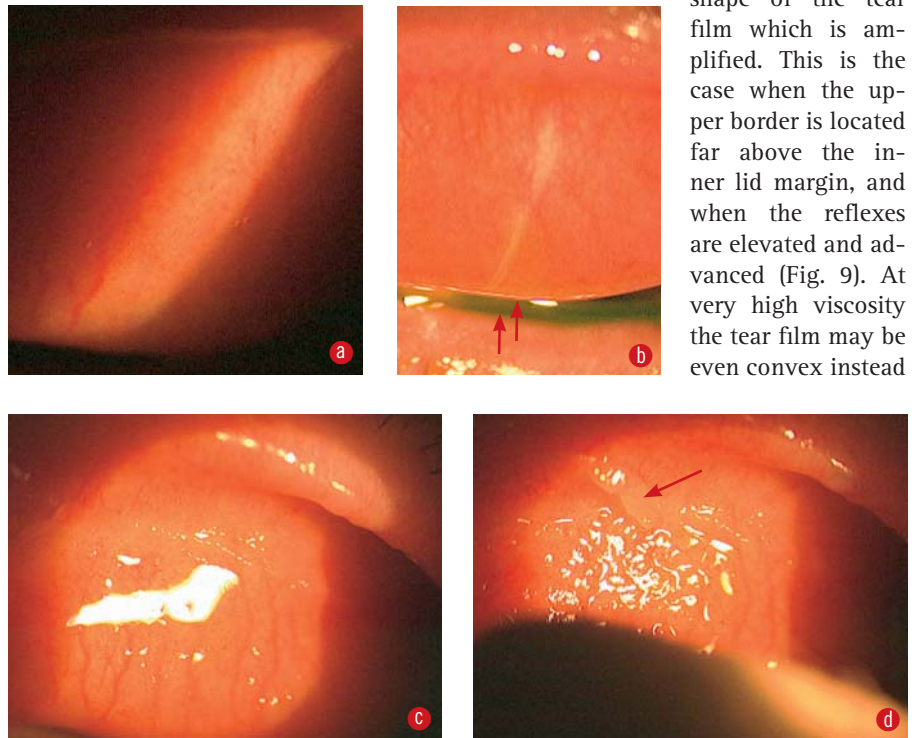


Fig. 10 Signs of inconspicuous fibrin at the everted upper tarsus

- a Air bubbles trapped in the otherwise invisible fibrin layer covering the upper tarsus.
- b Double contour at the upper border of the tarsus (in the everted lid here: below) indicating the presence of a covering layer of fibrin.
- c Flat reflex on upper tarsus due to the presence of a smooth even fibrin film.
- d After sweeping the tarsus with the cotton tip (shadow, lower left area) the bare surface shows a rugged reflex. The fibrin has been shifted aside and its accumulation covers the upper tarsus (arrow).



Fig. 11 Non-Healing Erosion:

The erosion is covered by cellular detritus which is kept immobile there by fibrin.

of concave. Additionally, there may be an overflow of tears despite lacrimal patency since the viscosity prevents the passage through the narrow canaliculus; and the viscous tears drop slowly and in thick globules².

The second sign, the fine fibrin layer, can best be recognized at the everted upper tarsus (Fig. 10). The entire ocular and inner palpebral surfaces may be covered with a fibrin film but only the upper tarsus is a place for an easy detection. The first suspicion arises from observing a very even flat mirror reflex at the surface instead of the slightly granular reflex of a normal tarsus. Another sign is the appearance of immobile inclusions, e.g. air bubbles. The final proof of

fibrin is obtained by sweeping the tarsus with a cotton tip and so removing the layer altogether (note: fibrinous adhesions can be swept away only against the resistance of the firm tarsus, while in the mobile parts the entire conjunctival tissue moves with the tip and the fibrin remains adherent).

Therapy. The treatment goal is to free the patients from the often overwhelming foreign body sensation, from the urge of rubbing their eyes, and to provide an undisturbed sleep, that is, to make life more tolerable until the inflammation has healed.

As a tentative treatment I used Acetylcystein drops (the only readily available substance then) 3 times every 5 minutes, followed by the instillation of undiluted Healon® (leftovers from surgery). After one repetition the following day no further antifibrin treatment was necessary despite persisting inflammation. Certainly today better medications can be found. The described attempts had dramatic results and prove that there are ways to achieve these goals.

Fibrin may play also an important role in non-healing corneal erosions. Signs for suspicion are epithelial detritus within the erosion, kept immobile in place by the invisible fibrin layer (Fig. 11). Other signs are reclined epithelial flaps hold in position by fibrin, recognizable by a straight border of the erosion at the hinge of the reversed flap (Fig. 12). The presence of fibrin is best confirmed, again, by sweeping the upper tarsus with a cotton tip.

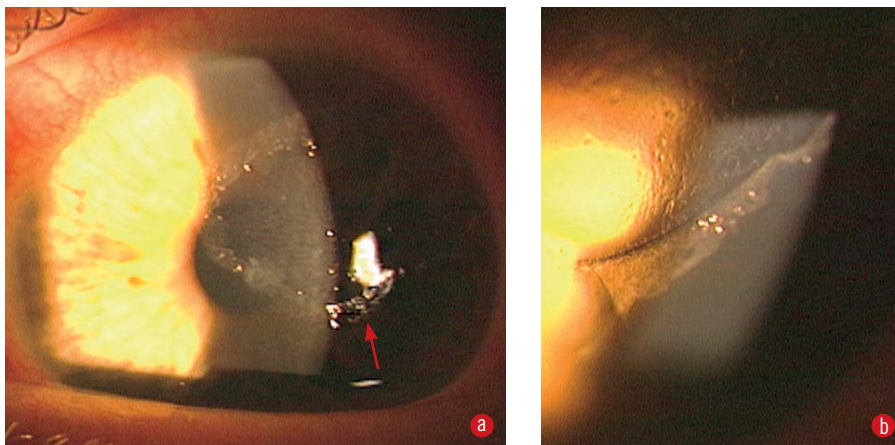


Fig. 12 Reclined Epithelial Flap in a Non-Healing Corneal Erosion:

- b Erosion with loose greyish material along its border. At the lower right quadrant a reclined epithelial flap is recognizable by its surface reflexes.
- b Reclined flap in direct (right) and retro-illumination (left). Note the straight margin formed by the hinge of the reclined epithelium.

Is fibrin the cause of non-healing? Such a hypothesis is sustained by the effectiveness of antifibrin therapy: Longstanding erosions healed in one or two days.

5. Other Non-Dry «Dry Eye» Syndromes

Are there other clinical entities in which unspecific irritations of the tactile sensory nerves induce the feeling of dryness? For example:

«Dry Eyes» in post-LASIK patients?

Is the sensation of dryness caused by interrupted tactile sensory nerves, comparable to phantom limb pain of amputation stumps? If so, should therapy be directed on restoring the integrity of the nerves rather than on surface lubrication (perhaps nerve growth factors)?

«Dry Eyes» in contact lens wearers?

Is invisible epithelium impairment responsible for a unspecific stimulation of the tactile nerve endings? Should therapy then be directed on epithelium cells themselves rather than on surface problems (perhaps epithelial growth factors or nutritional factors)?

6. Conclusion

The concept of a non specific nerve stimulation as the cause of tactile sensation, i.e. the basis of the non-dry «dry eye» complex should be considered whenever we are confronted with patients complaining about dryness but showing no convincing signs of dry eyes³. The results of the first attempts of treatment seem «to good to be true». They justify at least an appropriate analysis in larger series. This is why I conclude my «presentation in an unusual format» with the rather usual final words: Further studies are necessary ...

- 2 Compare to actors in movies in which a convincingly weeping is induced artificially by the instillation of viscous eye drops (natural tears are not impressive enough).
- 3 The Schirmer test is not reliable for dry eye diagnosis. Schirmer designed it for another, solely qualitative purpose – the localisation of lesions in case of facial nerve paralysis. It is not precise enough for quantitative measurements of fluids because it takes length for volume without sufficient information about the other two parameters.

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