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A New Technique for the Treatment of Lacrimal Gland Prolapse in Blepharoplasty

Gertrude M. Beer, M.D. and P. Kompatscher, M.D.

Feldkirch, Austria

Abstract. The lateral temporal fullness of the upper eyelid in patients presenting for a blepharoplasty is sometimes due to a prolapse of the lacrimal gland. The operative procedures that attempt to reposition the migrated lacrimal gland have been either dangerous in that they cause a dry-eye syndrome or unsatisfactory in that they have a high rate of recurrence or other complications. A new and different operative approach to a herniated or prolapsed lacrimal gland deals with an extraglandular concept of repositioning the gland that corresponds to the general principles of hernial surgery.

Key words: Lacrimal gland prolapse — Blepharoplasty

The inevitable process of involution leads to the alteration of all tissues. In the upper eyelid this involution results in a progressive laxity of the structures supporting the globe. This includes skin slackness, hypertrophy or atrophy of the orbicularis muscle, and weakness of the orbital septum with possible herniation of the intraorbital fat, and does not exclude a more or less pronounced migration, dislocation, prolapse, or herniation of the lacrimal gland. Excluding eyebrow ptosis, prolapse of the lacrimal gland is responsible for the full look in the temporal third of the upper eyelid in more patients than expected. The rate varies from 10% to 15% both in the literature [13] and in our experiences, depending on the age group of patients desiring a blepharoplasty. This rate definitely decreases when dealing with other etiological factors. There is a wide variety of primary [7] and secondary etiological reasons (Table 1). In the second group the constitutional [2] and involutional groups consist of the majority of patients desiring a blepharoplasty. These are the groups we are mainly dealing with (Figs. 1, 2).

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Correspondence to Gertrude M. Beer, M.D., Department of Plastic, Aesthetic and Reconstructive Surgery, Carinagasse 47, 6800 Feldkirch, Austria

Anatomical Considerations and Clinical Examination

In contrast to the existing techniques, the prolapsed lacrimal gland is reduced to its orbital bed and recurrence is hindered by reinforcing the supporting structures with local available tissue. To demonstrate the operative technique, we need to take a glimpse at the underlying anatomy.

Table 1. Reasons for the "full look" in the temporal third of the upper eyelid

Primary reasons:	Congenital ptosis
	Craniofacial deformities (Apert, Crouzon, Seathre-Cotzen)
Secondary reasons:	Endocrinologic (thyroid eye disease)
	Post-traumatic (increased orbital pressure)
	Postinfectious (leprosy, mumps)
	Constitutional (recurrent edema, involutional processes)

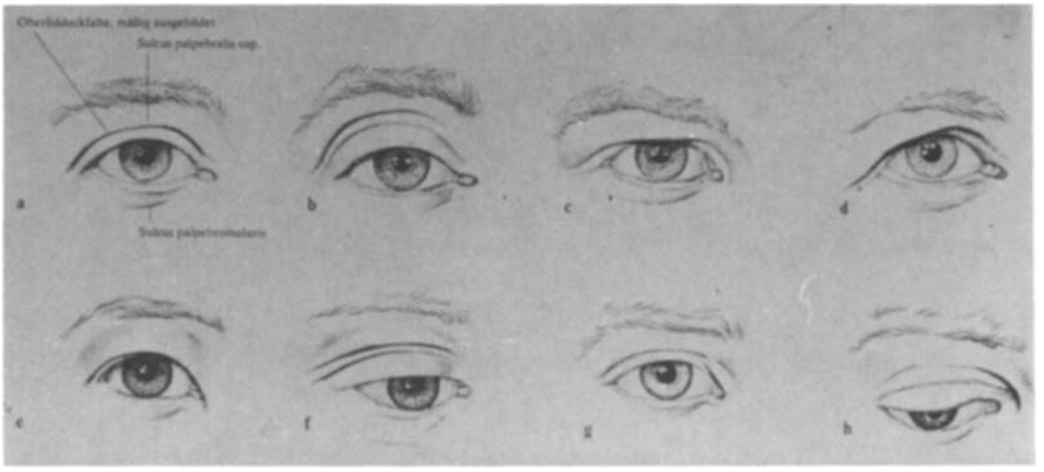

Fig. 1. The different forms of upper-eyelid deformities. **(a)** original form of the upper eyelid (Caucasian), **(b)** barely developed cover fold of the upper eyelid, **(c)** overhanging cover fold in the middle third of the upper eyelid, **(d)** temporal fullness with suspicion of lacrimal gland prolapse, **(e)** mongolic fold, **(f)** doubled superior tarsal sulcus, **(g)** tarsal crista, epicanthal fold, **(h)** epicanthal fold, eye nearly closed (from Sieder, 1938)

Fig. 2. Clinical examples: Patients with temporal fullness presenting for an upper-eyelid blepharoplasty. Patient with a lacrimal gland migration and an additional thyroid eye disease: **(A)** frontal view, **(B)** lateral view. Patient with a lacrimal gland prolapse: **(C)** frontal view, **(D)** lateral view

The lacrimal gland with its two lobes, the bigger orbital lobe and the smaller palpebral lobe [15], lies in the lacrimal gland fossa of the frontal bone which forms its superior relation. Inferiorly it rests upon the globe of the eye which forms and molds the entire gland. Superficial to it from inside to outside there lies a variable layer of fat, a possible continuation of the central compartment's intraorbital fat,

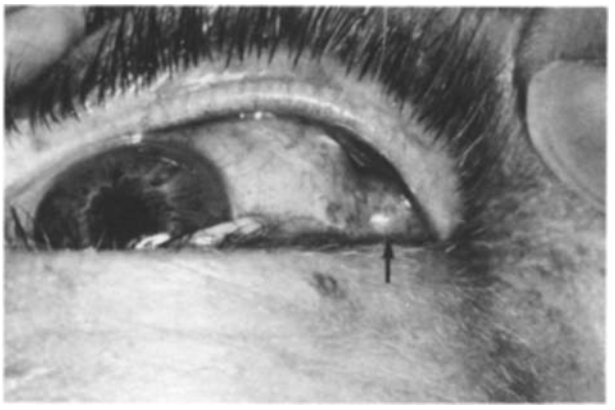

Fig. 3. Clinical examination of the prolapsed lacrimal gland. Arrow points to the indirect sign of prolapsed gland, herniated palpebral lobe of the lacrimal gland in the lateral conjunctival fornix

the orbital septum, the orbicularis muscle, and finally the skin of the eyelid.

The two lobes are incompletely separated by the lateral horn of the aponeurosis of the levator muscle that is cut deeply into the gland so that only a small bridge of glandular tissue remains posteriorly. This bridge is the reason why there is simultaneous prolapse of the two lobes. The orbital lobe is solely responsible for the impression of lateral fullness of the upper eyelid depending on the amount of herniation.

Normally, the lacrimal gland's anterior border runs completely parallel to the orbital margin, as far laterally as the zygomatic frontal suture, and is virtually hidden behind this border. The palpebral lobe, about half the size of the orbital lobe, is situated beneath the aponeurosis of the levator muscle and cannot be seen directly in case of a prolapse.

Clinical Examination

Examination generally reveals fullness in the temporal half of the upper eyelid, sometimes even a noticeable bulge that gives the impression of temporal ptosis. Palpation reveals a barely lobulated, easily reduceable mass that is firmer than the adjacent intraorbital fat. The retropulsion of the globe may aggravate the symptoms of prolapse. An indirect indication is seen upon inversion of the eyelid [6] where the simultaneously herniated palpebral lobe is displaced far into the conjunctival corner laterally (Fig. 3).

Ultrasound [11] of the eyelid has mainly been used to examine tumors in the lacrimal gland or involvement of the gland in case of systemic disorders of the hemopoetic and lymphatic system. Recently, ultrasound has been used for the detection of cysts, acute inflammation, chronic atrophy, and all changes of position. The experience gained with ultrasound in tumor surgery has enhanced discovering the proper location and the actual size of the gland.

Surgical Techniques

The following procedures have been used to correct a herniation of the lacrimal gland:

(1) *Resection of the prolapsed part* [5] *of the gland.* This technique is said to be too dangerous since a functional loss of tear secretion is possible. As a matter of fact, tear secretion diminishes spontaneously with age. By the age of 70 tear secretion is usually reduced to one-third or even less [4]. Furthermore, one cannot rely on the accessory lacrimal glands of Krause and Wolfring [3, 12] to function sufficiently as it has sometimes been assumed. These facts result from observations of partial resections either of the orbital lobe (Bernard) or the palpebral lobe (de Wecker) [1] when treating cases of epiphora or resecting parts of the gland in case of a tumor.

(2) *Repositioning and reinforcing the prolapsed gland into the orbital fossa.* One or two sutures of nonresorbable material are placed through the inferior edge of the gland and are then fixed to the periosteum under the superotemporal orbital rim with the goal that the gland should remain there safely. This technique, however, bears a lot of disadvantages: (a) the danger of the nonresorbable threads cutting through and probably causing the formation of cysts, and (b) the technical challenge to position the sutures safely in the thin periosteum on the orbital roof far enough dorsally while running the risk of destroying the suspensory ligament of Semmering.

Dissatisfied with these techniques, we thought of another method of repositioning the herniated gland sufficiently and, above all, causally. When treating the real cause of herniation we stuck with the general principles of hernial surgery by reducing the gland only and by predominantly reinforcing the supporting and weakened prebulbar structures in front.

Our Surgical Technique

In our blepharoplasty, the usual skin incision is made in the upper eyelid and the redundant skin is excised [9]. The orbicularis muscle is severed, whereupon the orbital septum is identified. This structure is of very irregular thickness and texture [10], therefore, it is not sufficient to keep the lacrimal gland in its proper position against the force of gravity.

The septum is opened by the usual stab incisions to resect the intraorbital fat in the medial and central fat compartments in cases of superfluity. In the temporal third the septum is opened by a larger incision

Fig. 4. **(A)** Whitnall's ligament, the transverse ligament, and its relationship to the lacrimal gland (from [7]). **(B)** Arrow points to anatomical example of Whitnall's ligament (from a coronary incision). **(C)** Arrow points to clinical example of Whitnall's ligament

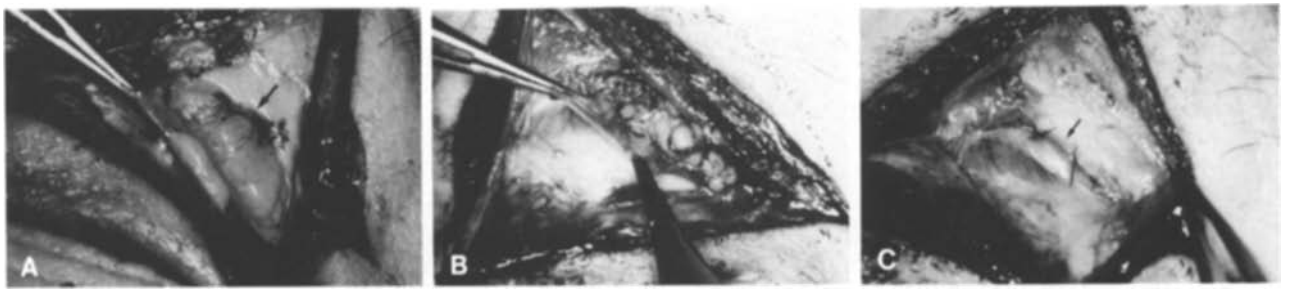

Fig. 5. **(A)** The prolapsed lacrimal gland with the bony orbital rim above. **(B)** The ligament of Whitnall elevated over the redisposed gland. **(C)** Fixation of the Whitnall ligament on the orbital rim with two nonresorbable sutures

Fig. 6. Patient with lacrimal gland migration. Preoperative **(A)** frontal, **(B)** lateral view, and early postoperative **(C)** frontal, **(D)** lateral view

upon which the lacrimal gland is easily identified by its pinkish-tan, lobulated, firm structure in contrast to the yellow, soft, intraorbital or suborbicular fat tissue [8]. Sometimes an expansion of fat of the central compartment overlies the gland. This fat is always resected. The gland, suspended from the orbital roof, is not moved in order to avoid weakening the supporting structures. The gland is gently positioned into the orbital fossa, the lateral third of Whitnall's ligament is mobilized carefully, rectangularly bent over the repositioned gland and fixed to the periosteum of the orbital rim which is rather thick in contrast to the thin periosteum of the orbital fossa. The position is fixed with two sutures of nonre-

sorbable material (Fig. 4). By the tension exerted from the rectangularly oriented ligament, the lacrimal gland is completely reduced and definitely repositioned.

The ligament of Whitnall [3], the transverse ligament, has proved to be a constant, thick, and easily identifiable structure. It is part of the fascial sheath of the levator muscle, which is thin in the posterior part of the orbita and becomes thicker in the anterior part. It surrounds the entire muscle continuously up to the muscular-aponeurotic junction. This sheath is particularly well developed on the superior anterior surface where it has become a stout condensation forming the transverse ligament (Fig. 5). This is inserted on either side of the lateral and medial orbital margins. Further anterior the sheath becomes very attenuated until it ends and blends with the orbital septum. Its function is said to be a check ligament controlling the movement of the muscles in the upper part of the eye. Irrespective of the amount of control, one should not completely detach the medial and lateral fixations on the orbital wall; only the small part in the lateral third adjacent to the lacrimal gland should be used for the operative procedure. In addition, the regional nerve supply is not endangered at all since the superior branch of the oculomotorius nerve is deep between the opticus nerve and the rectus superior muscle and enters the levator muscle on its undersurface. The lacrimal nerve enters the lacrimal gland together with the lacrimal vessels on its posterior pole and is not endangered either.

Conclusion

The operative technique of repositioning a herniated lacrimal gland by means of reinforcing the supporting structures according to the principles of hernial surgery in general is easy, quick, excellently reproducible, and causal. The functional outcome of the eye mobility and visus has not been impaired in our patients (Fig. 6) in the followup period of two years.

References

1. Bosniak S: Ophthalmic plastic and reconstructive surgery in the United States: 1893–1970. Adv Ophthalmol Plast Reconstr Surg **5:**241–281, 1986
2. Custer PhL, Tenzel RR, Kowalczyk AP: Blepharochalasis syndrome. Am J Ophthalmol **99:**424–428, 1985
3. Duke-Elder S: The anatomy of the visual system. In: Duke-Elder S (ed): System of Ophthalmology. St. Louis: C.V. Mosby, 1975, vol II, pp 450–467
4. Gobbels M: Das trockene Auge, Standortbestimmung und Aussichten. Fortschr Ophthalmol **87:**190–197, 1990
5. Hinderer UT: Aging of the palpebral and periorbital regions. In: Gonzalez-Ulloa M (ed): Aesthetic Plastic Surgery. Padova: Piccin, 1987, vol II, pp 1–93
6. Holly FJ, Lamberts DW, Buesseler JA: The human lacrimal apparatus: anatomy, physiology, pathology, and surgical aspects. Plast Reconstr Surg **74:**438–445, 1984
7. Jordan DR, Germer BA, Anderson RL, Morales L: Lacrimal gland prolapse in craniosynostosis syndromes and poor function congenital ptosis. Ophthal Surg **21:**97–101, 1990
8. Malcolm DP: The surgical management of upper eyelid hooding. Aesth Plast Surg **13:**183–187, 1989
9. Miller CC: The excision of bag-like folds of skin from the region about the eyes: a classic reprint. Aesth Plast Surg **12:**155–156, 1988
10. Plaza de la M, Arroyo JM: A new technique for the treatment of palpebral bags. Plast Reconstr Surg **81:**677–685, 1988
11. Rochels R: Echographische diagnostik in der ophthalmologie. Fortsch Ophthalmol **86:**524–529, 1989
12. Sakai T: Major ocular glands (harderian gland and lacrimal gland) of the musk shrew (Suncus murinus) (with a review on the comparative anatomy and histology of the mammalian lacrimal glands). J Morphol **201:**39–57, 1989
13. Smith B, Lisman RD: Dacryoadenopexy as a recognized factor in upper lid blepharoplasty. Plast Reconstr Surg **71:**629–632, 1983
14. Smith B, Petrelli R: Surgical repair of prolapsed lacrimal glands. Arch Ophthalmol **96:**1132, 1978
15. Werb A: The history and development of lacrimal surgery in England and Europe. Adv Ophthalmol Plast Reconstruct Surg **5:**233–240, 1986