



## Classic Reprint

### Epiphora in facial paralysis

C. R. McLaughlin

*The Queen Victoria Hospital, East Grinstead, UK*

---

**SUMMARY.** Epiphora is a common and most troublesome feature of permanent facial paralysis. A review of the mechanism of normal lacrimal drainage indicates that several factors are concerned in causing this epiphora. Surgery should be directed towards supporting the cheek, relieving the ectropion, and modifying the lower punctum. The various methods of securing these objectives are discussed. The results in 14 patients dealt with personally are tabulated.

---

Patients with permanent lesions of the facial nerve suffer from a sad variety of disabilities. These may include dribbling, difficulty in chewing, facial asymmetry, and lagophthalmos; but with many patients persistent epiphora is the worst feature of all. It is also one of the most constant.

The epiphora associated with facial paralysis must primarily be due to inaction of the orbicularis oculi; but in order to analyse the problem more precisely, it may be well first of all to review the normal processes of lacrimal drainage, particularly the proper function of the orbicularis muscle.

#### *Lacrimal drainage*

The tears secreted by the lacrimal gland do not run straight down over the cornea, since this would obviously disturb vision; they tend to pass laterally by surface tension and form the main tear lake at the outer canthus. From this point they run as a marginal strip along the lower lid to the inner canthus, the tarsal secretion in normal circumstances preventing any overflow.

The further passage of the tears into the lacrimal sac is assisted by the action of the orbicularis oculi. The lacrimal portion of this muscle is attached to the fascia covering the lacrimal sac. When the orbicularis contracts it pulls on the fascia and dilates the sac. It also shortens and widens the lower canaliculus and inverts the punctum. This occurs each time patient blinks. (As it is thought that the upper canaliculus removes only about 10 per cent of the tears, we are mainly concerned with the lower one.)

Once they have reached the lacrimal sac, the tears pass down into the nose partly by capillary action and the force of gravity and partly by the elastic contraction of the sac. It is doubtful if there are any cilia in the canaliculus, lacrimal sac, or nasolacrimal duct (Wolff, 1948).

#### **The problem**

The factors which are likely to be significant in causing paralytic epiphora are as follows: there is no contraction of the orbicularis to dilate the lacrimal sac; the punctum is not in contact with the eye, and it is almost invariably found to be stenosed; the caruncle is unduly exposed and becomes hypertrophied; the lacus lacrimalis lies mainly in the middle of the sagging lid, and away from the canthi; finally, there may be increased lacrimal secretion for two reasons: first, there is undue exposure of the eye from lagophthalmos and ectropion, though it may be noted in passing that corneal ulceration is surprisingly rare; secondly (and this appears to have escaped sufficient notice), interference with normal drainage leads to an increased dispersal of tears by evaporation. Since water evaporates and electrolytes do not, the salt content of the tears must rise. The work of Krogh, Lund and Pedersen-Bjergaard (1945) has shown that a rise from the normal (0.9 per cent) to 1.5 per cent of salt in the tears may cause irritation to the eye and an increased lacrimal secretion.

This brings us to the question of what is needed to relieve epiphora in these patients, and it is clearly necessary to achieve four objectives: first, the flaccid cheek must be supported to ease the pull on the lower lid; second, the lid itself must have its normal tension and position restored; third, the lower punctum must be permanently dilated. This is achieved by extending its opening down to the ampulla or still further medially; and, last, the caruncle (if enlarged) must be reduced.

#### *Operative possibilities*

It may be useful at this stage to refer briefly to those operations which appear inadvisable, or have proved inadequate. They include the use of lead weights or

tantalum strips in the upper lid, or of "supporting" cartilage in the lower. The experimental method of transplanting the lower punctum and canaliculus into the lower fornix is difficult to carry out and has proved, on the whole, disappointing—probably on account of obstruction by conjunctival flaps.

Simple dilatation of the punctum, without any excision of tissue, is almost always of only temporary benefit; and still more radical surgery to the canaliculus may be, by itself, ineffective. Similarly, a lateral tarsorrhaphy alone has in some cases failed to give relief.

As regards the use of wire to support the cheek, it is hardly necessary to reassert that this is an unsatisfactory method, and that even physically inert metals, such as tantalum, are subject to electrolytic changes, at least in close relation to metallic dental fillings.

#### *Methods of choice*

The first part of the surgical plan must be to support the cheek and the corner of the mouth. In the established methods of static support strips of fascia lata are employed; one, inserted as a figure-of-eight, embraces the corner of the mouth and takes a bite of the unparalysed portions of the oral sphincter.

A second strip of fascia is sutured to the figure-of-eight and runs obliquely up to a point of fixation.

Customarily this point has been either the temporal fascia or the zygomatic arch. It was recently suggested (McLaughlin, 1949) that the best point is the anterior part of the lower border of the malar bone. This can easily be drilled, and it offers a rigid and much less remote point of fixation (Fig. 1).

While this is an excellent standard procedure, there is undoubtedly an attraction, both to patient and surgeon, in some type of muscle sling (Gillies, 1934). Apart from the advantage of voluntary movements, this can also act as a static support when the face is in repose.

Recently, transplantation of the temporalis tendon has been tried, using a direct approach to the coronoid (Fig. 2); but the method is still at an experimental stage, and a preliminary report would be premature.

Whatever the method, mere symmetry of the mouth is of less significance than proper support of the cheek. Only when this has been achieved will the surgeon be justified in operating on the eyelids.

#### *Eyelid surgery*

In principle, the sagging lower lid may have its proper tension and position restored by a plastic procedure at either canthus. In practice, a lateral tarsorrhaphy is the simplest method of achieving this object; at the same time any tendency towards eversion of the punctum is best treated by a transposed flap at the inner canthus

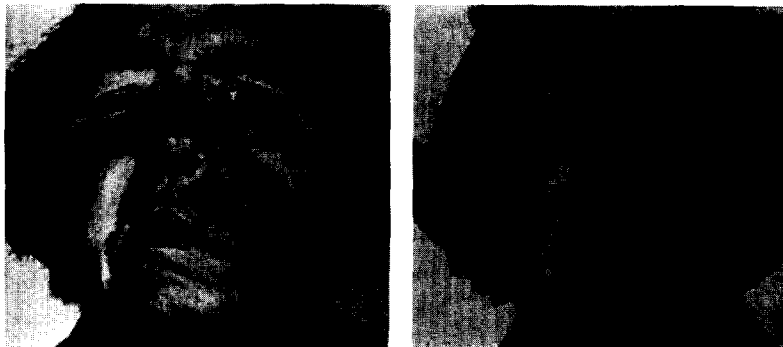


Fig. 1

**Figure 1**—Patient aged 60, with paralysis of twenty-five years' duration, before and after treatment. In this case the fascial sling supporting the cheek was fixed to the left malar bone.



Fig. 2

**Figure 2**—Patient aged 52, with paralysis of ten years' duration, before and after treatment. The right corner of the mouth has been attached by a fascial strip to a transplanted portion of the temporalis tendon. In each case the patient is attempting to smile.



Fig. 3

Figure 3—Patient aged 59, with right-sided epiphora of ten years' duration, before and after eyelid surgery. The eye is now dry.

(Fig. 6). These operations (which appear to differ in certain details from the standard textbook methods) are carried out in the following way.

Near the outer canthus a triangle of skin is excised from the lower lid, together with the eyelashes, down to the tarsal plate. A corresponding triangle of conjunctiva only is removed from the inner surface of the upper lid. A silk mattress suture is then inserted; this transfixes the upper lid through the skin and tarsal plate and enters the raw surface of the lower lid; a "loop on the mucosa" is made, and the suture returns by a similar route. It is brought through a tiny section of rubber tubing and then tied (Fig. 4). A second mattress suture is advisable.

These sutures draw the lower lid under the upper, so that the two tarsal plates partly overlap. Also, the excision and suturing are so designed that the lower lid is drawn in a lateral, as well as an upward, direction. The lower eyelashes cannot complicate the closure or vitiate the final appearance; and there is a great advantage in the unaltered normal sweep of the *upper* eyelashes, which largely conceal the presence of any tarsorrhaphy (see Fig. 5). This method differs from the classical tarsorrhaphy of Elschnig, who overlaps the tarsal plates but leaves the lower lid margin and eyelashes intact (Arruga, 1946; von Blaskovics and Kreiker, 1945).

The internal canthoplasty involves the transposition of a small triangular flap from the upper lid; this is "advanced" laterally as far as possible when being set into the lower lid. The initial Z-shaped incision therefore is not of the usual design—the lower limb being longer than the others (Fig. 6). This tends to produce a slight entropion, which is useful in this situation.

Finally, the punctum and canaliculus must be considered. In most of the cases in this series a dilatation and slitting of the full length of the canaliculus have been done; this is followed by a vertical cut on the conjunctival surface of the lid down to the ampulla (Fig. 7), and a third cut horizontally to meet the original slit. This achieves a triangular excision of the roof and posterior wall of the canaliculus (Fig. 8). The new ostium lies as near as possible to the lacrimal sac, thus making the passage through which the tears must travel as short and direct as possible.

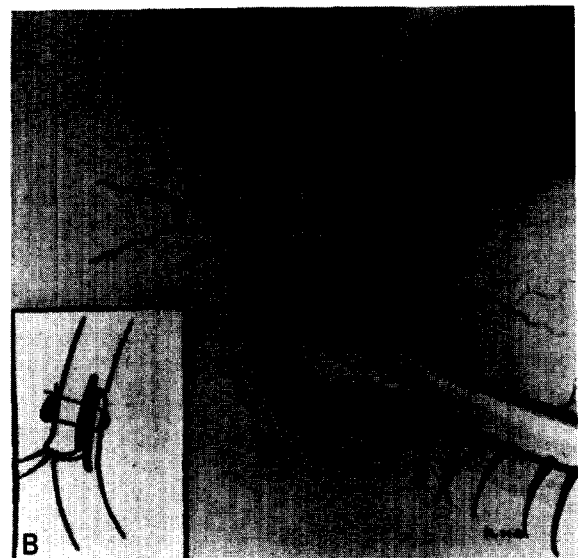


Fig. 4

Figure 4—Diagrams showing (A) the incisions and (B) the method of suturing recommended for a lateral tarsorrhaphy, with overlapping of the tarsal plates. The operation is designed both to elevate the lower lid and to draw it in a lateral direction.

Enlargement of the caruncle may occasionally give rise to difficulty. If the caruncle is reduced by diathermy, it is possible (though unusual) for adhesions to form around the new ostium. If the enlarged caruncle is left, it may act as a cork, not unlike the



Fig. 5

Figure 5—The appearance of the eye following operation by the method described. Note how the natural sweep of the upper eyelashes tends to conceal the presence of a tarsorrhaphy.



Fig. 6

**Figure 6**—The design for an internal canthoplasty. The markings have been made on photographs of a patient with epiphora of fifty-one years' duration, before and after transposition was carried out.



Fig. 7

**Figure 7**—The method of making the second (vertical) "snip," from punctum to ampulla.



Fig. 8

**Figure 8**—This indicates the triangular area which is excised from the *inner* surface of the lid, thus removing the posterior wall of the canaliculus.

enlarged middle lobe of the prostate. In practice it is probably best not to cauterise the caruncle till later. If it appears at fault, and epiphora persists, the instillation of adrenaline should clarify the diagnosis. Thus, if the adrenaline gives relief, the caruncle is probably at fault and can then be reduced.

It should be added that some experienced surgeons deplore any slitting of the canaliculus in these cases, and favour a purely local excision of the conjunctival wall as far as the ampulla (Stallard, 1949). In certain cases this is undoubtedly sufficient; but it always leaves a long passage for the tears to negotiate, unaided by cilia or by the pumping action of the orbicularis.

### Discussion

The results in 14 patients with paralytic epiphora are set out in Table I. It will be noted that no rigid surgical routine has been attempted in this personal series, but in every case the first operation was designed to support the cheek. In most of the severe cases a lateral tarsorrhaphy has been performed, and local surgery has been carried out for every stenosed punctum (Table II). In no instance has partial excision of the lacrimal gland been indicated.

Thus, out of 14 patients, 12 are well satisfied with the relief of their epiphora, and it is safe to say that any patient who has been cured of this objectionable symptom is as delighted as the surgeon.

There appears to be no tendency to a relapse; on the other hand, success should not be assessed for three to four weeks after the final operation, as a mucous conjunctivitis may temporarily disturb lacrimal drainage. In any doubtful case the instillation of 1 per cent

**Table 1** Analysis of treatment

	Duration (in Age years)		Malar sling	Temporalis sling	Lateral tarsorrhaphy	Internal canthoplasty	Excision of caruncle	Canaliculus, excision of roof	Punctum, local excision	Result
Severe cases										
A.T.T.	47	26	+	...	+	...	+	+	...	Satisfactory. Patient states "eye almost perfect."
R.E.G.	35	20	+	...	+	+	+	+	...	Dry eye. Fluorescin test positive. Can tolerate fumes in chemical works.
L.A.F.	49	3	+	...	+	...	...	+	...	Eye almost dry. Fluorescin test positive.
D.U.E.	52	51	+	...	+	+	+	+	...	Cured.
I.L.W.	68	27	+	...	...	+	...	+	...	Cured.
H.I.W.	64	$\frac{3}{12}$	+	...	+	+	...	+	...	Unsatisfactory owing to an obstruction at the medial end of the canaliculus.
I.N.W.	59	10	...	+	+	+	...	+	...	Cured. Fluorescin test positive.
A.R.W.	41	12	...	+	+	+	...	+	...	Cured. Fluorescin test positive.
O.M.C.	30	12	...	+	+	...	...	...	+	Cured. Fluorescin test positive.
Slight cases										
H.E.S.	64	2	+	...	...	...	...	...	...	Patient does not feel that slight epiphora merits operation. Dilatation of punctum gave only temporary relief.
O.K.C.	60	25	+	...	...	+	...	+	...	Epiphora much less.
O.R.F.	43	$\frac{6}{12}$	+	...	...	+	...	+	...	Cured. Fluorescin test positive.
N.G.E.	13	00	+	...	...	...	...	...	...	Cured; "no trouble even in a wind."
U.L.D.	52	10	...	+	...	...	...	...	...	Cured.

**Table 2** Summary of operations. Total number of patients: 14. Average duration of paralysis: 15 years

Type of operation	Number of times performed
Malar sling	10
Temporalis sling	4
Lateral tarsorrhaphy	8
Internal canthoplasty	8
Excision of caruncle	3
Excision of roof of canaliculus	11
Surgical enlargement of punctum	1

fluorescin in the eye offers a useful test. If drainage is satisfactory a yellow stain should appear on the handkerchief within a few minutes when the nose is blown vigorously.

### Acknowledgements

My thanks are due to Sir Archibald McIndoe and Mr B. W. Rycroft for referring certain patients in this series to me, and also for valuable advice.

I am further indebted to my colleague, Mr R. H. Dale, for his artistic diagrams, and to Mr G. Clemetson for the photographs.

### References

- Arruga, H. (1946). "Cirugia Ocular." Barcelona.  
 Blaskovics, L. von and Kreiker, A. (1945). "Eingriffe am Auge." Stuttgart.  
 Gillies, H. D. (1934). *Proc. Roy. Soc. Med.*, 27, 1372.  
 Krogh, A., Lund, C. G. and Pedersen-Bjergaard, K. (1945). *Acta physiol. Scand.*, 10, 88.  
 McLaughlin, C. R. (1949). *Lancet*, 1, 255.  
 Stallard, H. B. (1949). Personal communication.  
 Wolff, E. (1948). "The Anatomy of the Eye and Orbit." London: H. K. Lewis.

Reprinted from Volume 3, pp. 87-95 (1950-51)