SOME THOUGHTS ON THE LACRIMAL CANALICULI*

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Epiphora may result from inadequacy of the canalicular passage anywhere along its course. Although a commoner source of epiphora lies in the diseased lacrimal sac and naso-lacrimal duct, the problem of malfunction of the canaliculus occurs sufficiently often to merit considerable thought. This paper deals particularly with 3 sites of canaliculus inadequacy or interference, and with certain conditions at these sites.

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EVERSION OF THE INFERIOR PUNCTUM, WITH OR WITHOUT ITS OCCLUSION

Before investigating the more difficult causes of epiphora in a patient it is important to establish both the patency and proper position of the inferior punctum. Where the punctum is chronically everted, associated chronic conjunctivitis may cause its occlusion. In such a case, intensive topical antibiotic therapy, followed shortly by cautery puncture to the conjunctiva adjacent to the punctum, is usually a most effective combined procedure.

Cautery Puncture

The only local anaesthetic required for this is the application to the area of 4% cocaine drops mixed with adrenaline 1 : 1000. Occasionally it may be necessary to apply solid cocaine crystals to the conjunctiva especially if the eversion is fairly well-marked.

Approximately 6 - 8 applications of the red-hot electrocautery point are made to the conjunctiva around the punctum, mainly inferiorly and inferolaterally. These penetrate for approximately 1 mm. and care must be taken not to involve the canaliculus, which in this part of its course is superficial. Frequently this procedure dramatically cures an elderly patient with a chronic dribbling, dirty, eye and raw, exposed palpebral conjunctiva on the medial aspect of a sagging lower lid.

The punctum may have been exposed for so long that it is extremely stenosed. It may then require a modified 3-snip operation to make it function. However, replacing the punctum in its proper position, where it snuggles close to the globe and can hardly be seen, produces a remarkable effect on the hardened, previously exposed punctum. I feel that the vast majority of puncta with varying degrees of stenosis respond to this treatment and in only a few cases will a 3-snip operation be necessary. The extent of the 3-snip operation should be restricted.

The cautery punctures may have to be repeated on occasion and massage with lanolin or zinc-cream ointment into the thickened taut skin of the lower lid may be required as an adjunct in certain cases. In most cases of eversion of the punctum of the lower lid as above described this treatment will prove satisfactory.

Where there is grosser ectropion with eversion of the punctum a deliberate plastic procedure by an ophthalmologist is indicated.

INTERRUPTION AND OBSTRUCTION IN THE INFERIOR CANALICULUS

This may cause the surgeon many long hours of frustration. Here, prevention of scarring of tissues in malposition is most important. Trauma is the commonest cause of inferior canalicular obstruction.

Canaliculoplasty by Primary Suture of a Recent Injury

The following is a case-report of an accidental injury in which this procedure was used effectively:

> After a head-on collision on the cricket field, the patient (Mr. O.Q.S.) was unconscious and suffered a severe facial laceration. His right lower lid was almost entirely torn away. An extensive and deep laceration traversed the medial canthus, proceeded across the lid laterally through layers down to the fornix, and then continued from the outer canthus down on to the cheek. This left the lid lying near his ear and attached only by a small amount of tissue.
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> The inferior canaliculus was reconstituted by the method to be described, together with extensive repair of the other lacerations. The patient recovered well with no epiphora. However, the deep-lying wound in the fornix contracted and an area of exuberant granulation occurred in the conjunctiva over the fornix. The bands were later freed and the granulations excised. Then a mucous membrane graft was made to the area and a skin and muscle operation was performed. Four months after the last procedure no epiphora was present.

Laceration of the inferior canaliculus below the medial canthus frequently occurs in a wide variety of injuries to the lower lid. These include assaults with the fist, stab-wounds, motor accidents, and a hanger hooking the lid (in a department store sale). I have treated many patients with such injuries in the manner to be described. Very often these patients are treated in the acute stages by casualty officers or junior residents, who do not appreciate the full extent of the injury. They usually know nothing of the resultant watering eye, nor of the cosmetic blemish of the ectropion of an inadequately-repaired lower lid.

The laceration invariably leaves the lateral portion of the torn inferior canaliculus held fast in the firm surrounding tissues of the lid with the cut end gaping. The medial portion shrivels up into the mass of ripped tissues and is amazingly difficult to identify. This may be impossible even with the injection of dye or milk *via* the upper punctum. If the medial portion of the canaliculus can be identified then a fine suture should immediately be attached to it. A 2 mm. polythene tube with a specially-made stylus (Fig. 1) should be passed *via* both portions of the canaliculus into the nose *via* the nasolacrimal duct.

Fig. 1. View of end of stylus in polythene tubing (enlarged).

I have found that the method first suggested by Greaves,[1] and since modified, most satisfactory. He described the retrograde passage of a cannula, containing blue nylon thread, along the canaliculus. Our theatre sister has modified Dr. H. J. van der Merwe's[2] idea and has made a fine probe which is inserted through polythene tubing. This probe may be used instead of the cannula and sometimes it is preferable.

With the patient under general anaesthesia, the probe or cannula is passed through the upper canaliculus. A curve is fashioned in the end of the instrument so that it may negotiate the junction of this canaliculus with the common canaliculus. Often the lower and upper canaliculi join in such a manner that no difficulty is met in passing the instrument, as described, into the medial portion of the torn lower canaliculus. Occasionally considerable difficulty is experienced, so much so that the sac may have to be opened and the canaliculus negotiated through it. Once the instrument is through the medial portion of the canaliculus no difficulty is found in bridging the gap with the tube going through the lateral portion of the canaliculus and out through the lower punctum. The procedure is an arduous one and may take hours to complete.

Once the gap has been closed, the probe or cannula is carefully withdrawn leaving the tube of nylon *in situ*. The tissues external to the canaliculus should be carefully sutured with 6 - 0 black silk on 81 - 7 Grieshaber needles. Then a deep vertical mattress suture (0 black silk) is inserted and should slightly overcorrect the medial canthus. The skin is sutured with 4 - 0 black silk. The strong mattress suture is important in preventing the wound from gaping — this marked tendency indicates the need for overcorrection.

The polythene tube or nylon should be well strapped to the forehead or cheek and a retaining suture should be placed near the inferior punctum and through the tube. This should be kept *in situ* for 6 weeks if possible. A careful watch must be kept to see that the punctum does not become torn through.

This procedure should be performed within 36 hours of the trauma — the sooner the better. Results have been encouraging. I have not kept figures, but success has frequently been achieved. It is interesting to note that the superior punctum is not at all efficient in maintaining the drainage of tears.

Once a stricture has occurred then a variety of plastic procedures, with or without mucous membrane grafts, will have to be attempted. These results do not compare with those of primary procedures.

OBSTRUCTION IN THE MEDIAL END OF THE CANALICULI

The last 2 - 3 mm. of the common canaliculus, before it enters the lacrimal sac, are affected here. The lesion often

involves the related sac wall. If the canaliculi enter the sac separately then they may each be affected by the condition. The occlusion may be complete or nearly so. Microscopic examination of such a lesion, which I removed in London some years ago, revealed a non-specific chronic inflammatory change.

Probing with the lacrimal cannula during irrigation and confirmation on X-ray examination with radio-opaque material will identify the condition. Partial occlusion of the canaliculus together with obstruction in the nasolacrimal duct may result in a ball-valve effect on the lacrimal sac, particularly at the time of irrigation; this would cause a distended sac.

Operative Procedure

The approach is similar to that made for dacryocystorhinostomy, except that the incision is placed slightly more laterally than the usual one on the nasal side of the medial canthus. The canaliculi at this deep level are found just under the deep fibres of the medial ligament, so care must be taken when dividing the ligament. A probe, which is inserted along the inferior and common canaliculi, is isolated, and the lesion is then identified. The obstruction is excised and the remaining canaliculus is invaginated into the elliptical gap which has been fashioned in the lateral wall of the sac. Sutures of 6 - 0 black silk on 81 - 7 Grieshaber needles maintain the position of the canaliculocystic junction. This is invariably a very protracted procedure and it is essential that complete haemostasis is obtained in the surgical field.

This haemostasis may be obtained by positioning the patient in the anti-Trendelenberg position and using diathermy coagulation to any bleeding points. Fluothane anaesthesia assists in attaining the ideal. Because of the usually protracted nature of the surgery I have found it better to avoid the use of hypotensive anaesthesia, particularly in elderly patients, except as above described. Occasionally I have used more intensive hypotensive anaesthesia, especially when surgery has already been performed in the area.

While the sac is open, the patency of the nasolacrimal duct must be established by irrigation. If the passage is not patent then a dacryocystorhinostomy must be performed there and then.

Although not many patients have had the above described 'canaliculo-dacryocystorraphy' to date, the results are encouraging, especially if the polythene tubing, which is left *in situ* in the canaliculus, can be maintained for several weeks.

Epiphora, especially in younger active people, is sometimes very incapacitating, and I feel that the long hours, often late at night, which may have to be spent completing some of the abovementioned manouevres, are well spent if the watering eye is cured or, better still, prevented.

SUMMARY

Three sites of possible inadequacy of, or interference with, the lacrimal canaliculi are discussed.

Operative procedures to correct conditions arising at these sites are described.

The photograph was taken by Mr. D. Smith, of the Department of Surgery, University of the Witwatersrand, to whom I tender my thanks.

REFERENCES

1. Greaves, D. P. (1958): *Eye Surgery*. p. 295. Bristol: John Wright (quoted by Stallard, H. B.).
2. Carter, M. and van der Merwe, H. J.: Personal communication.