PROGRESS NOTE. December 30, 1945. Dr. Batkin.

Patient has remained in good health since discharge from Bangour Hospital in February, 1944. The recovery of the vision has been maintained. Manages to perform her household duties, but recently tendency to tire has been noticed.

No headaches. No diplopia.

Visual acuity—Right J.1, 6/9 (partly). Visual acuity—Left J.2, 6/6 (partly). Visual fields to confrontation full on the right side with only a very slight depression in the upper left temporal field.

External ocular movements full. Pupils moderate in size, equal; light reaction shade less brisk in the left side as compared to the right. Normal fundi; right temporal aspect of left disc, however, somewhat pale.

Blood pressure 145/90.

The satisfactory improvement has been maintained during the past year, and patient is in satisfactory general physical condition in regard to her age.

Return list one year.

DACRYO-CYSTO-RHINOSTOMY*

BY

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REPORTS of the satisfactory results of the operation of dacryocysto-rhinostomy, in cases of chronic dacryocystitis associated with obstruction of the naso-lacrimal duct, have been published in recent years by Morgan,¹ Yanes,² Lethrop,³ and others, but this procedure is not universally adopted, and extirpation of the lacrimal sac has been the routine operation in most eye clinics.

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* Received for publication, December 19, 1945.

The idea of draining a mucocele of the lacrimal sac into the nose dates from the epochs of Celsus, Galenus, and Paulus Aegineta,⁴ but dacryo-cysto-rhinostomy performed by the external route was first described by Toti in 1904,⁵ and was modified by Dupuy-Dutemps in 1921.^{6 7 8}

The purpose of this article is not to describe a new procedure, but to stress the advantages of the "anastomosis" operation from the point of view of producing a functional cure, to introduce some new points in surgical technique in the light of recent experience, and to show that cases in which an operation for excision of the sac has previously been carried out are not necessarily unsuitable for the operation due to the fact that (a) the sac may not have been completely excised or even excised at all, or (b) a new "pseudo-sac" lined by epithelium may have formed.

A watering eye, in civilian life, is a most irritating and annoying symptom, even if it only occurs on exposure to cold weather or bright light, but, when occurring in a pilot, or other member of aircrew, the frequent necessity for wiping away the tears which tend to cause blurring of the vision, and fogging of the goggles or spectacles (if worn), may be so distracting as to produce a crippling disability rendering him unfit for flying duties.

The presence of a mucocele of the lacrimal sac, which is not acutely infected, but can be "expressed" by the patient at suitable intervals during the day, does not cause continuous epiphora, owing to its reservoir action. It is, however, a constant potential source of infection, and may give rise, not only to recurrent acute attacks of dacryo-cystitis, but also to attacks of conjunctivitis or corneal ulceration. A patient suffering from a simple mucocele of the lacrimal sac, unassociated with septic complications, will not, from his own point of view, derive any benefit from having his sac removed, because, instead of the occasional need for digital expression of the sac contents, he will be affected with a more or less constantly watering eye. Such a patient will, however, derive much benefit from a dacryo-cysto-rhinostomy, whereby a new and direct channel is made from the lacrimal sac into the nasal cavity. Moreover, it has been shown by Hughes, Guy and Bogart,⁹ that bacterial cultures are more frequently obtained from the conjunctival sac after dacryo-cystectomy than after dacryo-cysto-rhinostomy.

The commonest site of occlusion of the naso-lacrimal duct is probably at its upper end, in the region of its junction with the sac. During the last five years, numerous examples of occlusion by trauma have been encountered. Air crashes may, (in spite of the "harness" worn in most operational aircraft), cause the pilot's head to be thrown forward and to hit the instrument panel or rudder bar, resulting in fracture of the facial bones. The bone in the region

of the naso-lacrimal canal may thus be broken, the fragments pressing upon, or tearing, the naso-lacrimal duct, or lacrimal sac. It has been possible, in several instances, to demonstrate at operation the presence of portions of partially detached bone causing such obstruction. These fractures are, frequently, difficult to detect radiologically, owing to the small and flake-like nature of the fragments, but some information may be obtained from a stereoscopic antero-posterior view. It might be suggested that, in such cases, removal of the offending fragments of bone would result in restoration of the patency of the tear tract. The formation of scar tissue, however, renders such a possibility most unlikely.

A history of previous attacks of acute dacryo-cystitis is not a contra-indication to the operation of dacryo-cysto-rhinostomy, nor does the presence of a lacrimal fistula prejudice a good result. Furthermore, *a satisfactory result may be obtained when excision of the sac is said to have been already performed*, although some modification of technique may be necessary.

It has been stated that a serious complication of the anastomosis operation is the occurrence of conjunctivitis whenever the patient has a "cold in the head." This has been observed in one case only, and has been mild and transient in nature.

Technique

Pre-operative examination.—An examination of the nasal cavity (including X-ray examination if indicated) is made, and any obvious abnormality or infection, *e.g.* nasal polypi, sinusitis or a grossly deflected septum is dealt with before the operation of dacryo-cysto-rhinostomy is undertaken, so that as far as possible a clean field of operation is available.

In a certain number of cases lipiodol has been injected into the lacrimal sac and the site of obstruction demonstrated radiologically. This has invariably been situated at the upper end of the naso-lacrimal duct.

Preparation and Anaesthetic.—The nasal cavity on the affected side is packed, half an hour before operation, with ribbon gauze soaked in equal parts of 10 per cent. cocaine and 1/1,000 adrenalin, as in all intranasal operations. This limits haemorrhage from the nasal mucosa when it is incised.

Local or general anaesthesia may be employed, the latter being more satisfactory, and invariably used in our series of cases. It must be given through an intra-tracheal tube, the nasopharynx being packed to prevent blood draining downwards into the bronchi. An ether and oxygen mixture is usually employed. Pre-medication of opoidin gr. 1/3rd and scopolamine gr. 1/150 is given one hour before operation. A quarter of an hour before the incision

is made, an injection of 2 per cent. novocain and 1/1,000 adrenalin is given freely into the soft tissues between the root of the nose and inner canthus, and between the inner end of the eyebrow and inner part of the lower orbital margin. This helps to reduce haemorrhage when the incision is made in this very vascular area.

Operation.—The site of the incision, (Fig. 1), is higher and more medial than the classical one, as described by Toti. It is commenced midway between the inner canthus and the root of the nose, and carried down the side of the nose, curving slightly outwards, so as to end about an inch vertically below the lower punctum. The

FIG. 1.

Site of skin incision.

incision is carried right to the bone through the soft tissues, and all the tissue, including the periosteum and the attachment of the internal lateral ligament, which lies on the lateral side of the incision, is detached from the bone in one layer by means of a periosteal elevator, and displaced outwards. When the outer lip of the incision is retracted outwards, the lacrimal sac and upper end of the naso-lacrimal duct, (Fig. 2), are seen lying among the structures so everted. The inner quarter of the rim of the orbit should be thoroughly exposed, so that the fossa for the lacrimal sac is accessible *in its entire length*. No attempt should be made to dissect out the sac or duct before this is done, as the fossa is the guide to the sac. Bleeding points are secured in the usual way with fine artery forceps, but in addition the use of a "sucker" is desirable in order to keep the operation field quite dry.

FIG. 2.

Lacrimal sac exposed and dislocated outwards from the fossa.

FIG. 3.

Orbital aspect of right lacrimal bone with the adjoining bones indicated by interrupted lines. A—process downwards forming inner wall of nasal duct and joining inferior turbinate. B—hamular process. C—lacrimal crest. The continuous line D shows the amount of bone removed at operation.

(From "The Anatomy of the Human Skeleton," by J. E. Frazer).

The advantages of the medially placed incision, as opposed to one immediately over the sac, are two. First, it prevents damage to the lacrimal sac in the early stages of the operation, and, secondly, it prevents the formation of a "Mongoloid fold," which may be the sequel of an incision too near the inner canthus. When

the inner wall of the fossa for the lacrimal sac has been thoroughly exposed, and the sac retracted outwards by means of a self-retaining retractor of the mastoid type, sufficient bone is removed from the inner wall of the fossa and its neighbourhood to uncover an area of nasal mucosa of about the size of a sixpence. This is carried out by means of a small mastoid gouge and hammer, and the use of nibbling forceps, as required. It is essential to remove an adequate amount of bone in the neighbourhood of the fossa, in order to facilitate the easy anastomosis of the lacrimal sac to the nasal mucosa. This exposure of the periosteal aspect of the nasal mucosa usually entails removal of the entire lacrimal bone, a portion of the nasal process of the maxilla, and the neighbouring portion of the lamina papyracea of the ethmoid (Fig. 3). In so doing, ethmoidal cells may be opened, but this need not cause anxiety, and any portion of the ethmoidal labyrinth which obstructs easy access to the nasal mucosa may be confidently removed. If a large middle turbinate is encountered which may cause some obstruction to the new anastomotic channel it is wise to postpone its removal until later as otherwise adhesions may form. Identification of the lacrimal sac is not usually difficult, especially when it is distended to form a mucocele, but it is desirable at this stage to pass a probe along the lower canaliculus as a routine measure in order to aid and confirm its identification. This is especially necessary if the sac is fibrous as a result of disease or trauma.

The next step is to carry out an anastomosis of the medial wall of the lacrimal sac with the nasal cavity. This is done by means

FIG. 4.

Nasal mucosa exposed after removal of bone, showing site of incisions to form nasal flaps.

FIG. 5.

Nasal flaps cut. Site of incision for lacrimal flaps shown. The upper end of a probe, which has been introduced into the nostril, is seen between the flaps.

FIG. 6.

Posterior flaps sutured. Anterior flaps ready to be sutured. The end of a probe which has been passed through the lower punctum along the lower canaliculus is seen lying between the lacrimal flaps; and the upper end of the other probe which has been introduced through the nostril is seen lying between the nasal flaps.

of two posterior flaps and two anterior flaps cut from the lacrimal sac and the nasal mucosa, as shown in the accompanying diagrams, (Figs. 4 to 7). In order to ensure that the nasal flaps can be reflected correctly it may be necessary to "square up" the bony margins before inserting the sutures. The suture employed is No. 6/0 ophthalmic catgut, with eyeless needles. The skin wound is closed with interrupted silk sutures. A firm pad and bandage encourage haemostasis, and are retained for twenty-four hours.

After-treatment.—The dressing is changed at the end of twenty-four hours, and re-applied daily for four or five days, after which the stitches are removed and no further dressing is usually needed.

FIG. 7.

Suture of anterior flaps.

It has not been found necessary to carry out post-operative probing, or frequent syringing of the new anastomotic canal, and it is considered that absence of free patency on gentle syringing at the end of five days is an indication that the operation is a failure.

During the first week after the operation, some epiphora may continue, owing to post-operative swelling of the soft tissues, but, in a successful case, it will have ceased at the end of this period, when, as a rule, the patient leaves hospital.

Modified operation, in cases where the lacrimal sac is contracted.—In certain cases, it has been found impossible to make satisfactory flaps from the sac, on account of its small size. The sac may be so fibrotic as to be unidentifiable, or so small as to preclude the cutting of flaps. This does not necessarily mean that a good functional result cannot be obtained. When the probe is passed along the lower canaliculus, as previously indicated, it is gently

but firmly pushed on, so as to appear in the cavity of the wound, a small incision being made with a scalpel if necessary, to assist this manoeuvre. Scarred remains of the inner wall of the sac are then removed. A single anterior flap of nasal mucosa is cut, and sutured to the soft tissues of the outer lip of the incision immediately superficial to the probe. Direct drainage is thus established from the lower canaliculus into the nasal cavity, and a satisfactory outcome may be expected.

The operation of dacryo-cysto-rhinostomy is sometimes carried out by an ophthalmologist, and at other times by a rhinologist; but we feel that the combination of the two, working together, is the most satisfactory arrangement. In most cases, the primary incision and identification of the lacrimal sac are carried out by the ophthalmologist, whereas the removal of the bone and exposure of the nasal mucosa are carried out by the rhinologist, who is more used to this kind of work, and is capable of dealing with any concomitant condition existing in the ethmoidal air cells, which may be encountered in the removal of the bone. The anastomosis is performed by the ophthalmologist.

Case reports

The following 50 patients have undergone dacryo-cysto-rhinostomy under our care in three Royal Air Force Hospitals, (in the U.K., in M.E., and in C.M.F.), during the past five years.

They are classified as follows:—

1. Non traumatic ... .. 26 patients.
2. Traumatic :
  - (a) Aircraft crashes ... .. 12 patients.
  - (b) Car and motor-cycle accidents ... 3 patients.
  - (c) Sequelae of nasal operations ... 3 patients.
  - (d) Other trauma ... .. 6 patients.

Six patients had bilateral operation, bringing the total of operations to 56.

Analysis of cases (see Table)

This series of fifty cases, (of which six were bilateral, making a total of fifty-six operations), serves to illustrate some points of aetiology and symptomatology of naso-lacrimal duct obstruction, and the benefits to be anticipated if dacryo-cysto-rhinostomy by this technique is performed.

Prior to operation, all patients complained of continuous, and often copious, epiphora, and chronic recurrent infection of the conjunctival sacs.

TABLE OF CASES. I.—NON-TRAUMATIC CASES

Name, Rank and Age	History	Date of Operation	Result	Follow-up
1 AC. 2 L. V. H., 32 years	Left epiphora 22 years. Regurgitation from L. sac	Aug. 5, 1940	No epiphora; passage clear	Two attacks of conjunctivitis associated with "Cold in the head" during the last 4 years, but no watering since the operation
2 AC. W. R., 18 years	Acute dacryocystitis June, 1941. Epiphora persists	Aug. 18, 1941	ditto	—
3 AC. W. M. G. D., 37 years	Left epiphora for indefinite period. Regurgitation from left sac	March 5, 1942	ditto	—
4 L. AC. J. T., 22 years	R. epiphora—4 years. No history of trauma. Probed 4 times without cure	June 8, 1942	ditto	—
5 Sister P., 30 years...	Prolonged R. epiphora. <i>R. dacryocysto-rhinostomy on two previous occasions</i>	July 1, 1942	ditto	—
6 AC. R. G. D., 20 years	Bilateral lacrimal sac fistulae since infancy, with continuous epiphora	Aug. 15, 1942 (R.)	No epiphora; passages clear	25-11-44: "No watering or other ocular discomfort"
7 L. AC. A. B., 22 years	Prolonged L. epiphora. Probed without cure. Regurgitation from left sac	Aug. 25, 1942 (L.)	No epiphora; passage clear	—
8 AC. R. G., 33 years	Prolonged R. epiphora and regurgitation from right sac	Sept. 9, 1942	ditto	26-11-44: "Not a moment's trouble since operation"
9 AC. J. H., 41 years	R. epiphora—1 year. Mucocoele of lacrimal sac which can be evacuated into the nose by digital pressure	Oct. 7, 1942	ditto	—
10 AC. H. R., 35 years	Watering of both eyes, L. more than R. —4 years. Regurgitation from L. sac	Nov. 2, 1942	No epiphora; passages clear	Serving overseas
11 Sgt. J. B., 32 years	R. epiphora—2 years. R. duct probed twice. Regurgitation from right sac	Jan. 9, 1943 (L.)	No epiphora; passages clear	28-11-44: "Operation a complete success"
12 AC. S. F. D., 31 years	R. lacrimal abscess—1928. Frequent recurrences since, and continuous R. epiphora. Regurgitation from R. sac	Jan. 28, 1943	No epiphora; passage clear	1-12-44: "Occasional watering of eye in a cold wind"
		Feb. 20, 1943	ditto	

TABLE OF CASES. I.—NON-TRAUMATIC CASES—continued

Name, Rank and Age	History	Date of Operation	Result	Follow-up
13 L.A.C. A. L. P., 26 years	L. epiphora—8 months. L. lower canaliculus occluded, though upper is patent	Feb. 22, 1943	Epiphora persists. Passage clear through upper canaliculus	6-7-43—22-7-43: Passage clear through upper canaliculus. Epiphora relieved by excision of palpebral portion of lacrimal gland
14 L.A.C. J. R. D., 22 years	R. epiphora—15 years. Regurgitation from R. sac. "Excision" of R. sac 1942	June 14, 1943	No epiphora; passage clear	June, 1944: Condition satisfactory. No watering
15 L.A.C. R. R., 25 years	Bilateral epiphora and ocular discharge —1 year. "Excision" of R. sac on 2 occasions, and of L. sac on 3 occasions	June 8, 1943 (R.) June 22, 1943 (L.)	No epiphora; passages clear	Dec. 1944: Condition satisfactory. No epiphora since operation
16 AC. F. F. C., 42 years	R. epiphora—18 months. R. duct probed in July, 1943	July 24, 1943	No epiphora; passage clear	—
17 AC. V. R., 23 years	Bilateral epiphora—3 years. Both ducts probed on three occasions, and bilateral dacryo-cysto-rhinostomy performed	Sept. 29, 1943 (L.) Oct. 13, 1943 (R.)	No R. epiphora. Slight L. epiphora. Passages clear	27-11-44: Right eye satisfactory, but left continues "to water" slightly
18 L.A.C. P. W. P., 25 years	R. lacrimal sac "excised" in August, 1942 for epiphora. This persists	Oct. 2, 1943	Slight epiphora remains. Passage clear	—
19 L.A.C. F., 22 years	"Excision" of L. sac for mucocele in 1943. Left epiphora continues	March 1, 1944	No epiphora; passage clear	Passage subsequently contracted. Probing was ineffectual. Excision of half of lacrimal gland
20 AC. H. E. G., 42 years	Persistent right epiphora—6 months	March 17, 1944	ditto	—
21 AC. P., 30 years	L. epiphora—6 months, and regurgitation from L. sac	March 21, 1944	ditto	27-11-44: "Entirely satisfactory in every way"
22 AC. W. D. A. S., 20 years	R. epiphora—3 months	June 10, 1944	ditto	—
23 AC. T. S., 35 years	L. epiphora—3 years. Chronic left ethmoiditis	June 12, 1944 (external ethmoidectomy at same time)	ditto	—

TABLE OF CASES. I.—NON-TRAUMATIC CASES—continued

Name, Rank and Age	History	Date of Operation	Result	Follow-up
24 L.A.C.W. A. C. F., 24 years	L. epiphora—4 years. Regurgitation from L. sac, 2 years. <i>L. dacryo-cysto-rhinostomy on two previous occasions</i>	Sept. 15, 1944	No epiphora; passage clear	—
25 L.A.C. C. D. S., 21 years	R. epiphora throughout life. Probed without improvement	Sept. 28, 1944, Ant. flap only	ditto	1-12-44: Satisfactory; no watering
26 L.A.C. W., 22 years	L. acute dacryocystitis—1935. Epiphora and regurgitation since that time	Nov. 15, 1944	ditto	70-8-45: Entirely satisfactory. No watering
II.—TRAUMATIC CASES (i) Aircraft Crashes				
27 L.A.C. B. K., 25 years	Aircraft crash Dec. 9, 1940. Watering and discharge from R. eye since that date	March 15, 1941	ditto	Nov. 1941: (Serving overseas)
28 Sgt. D. W., 22 years	L. lacrimal fistula following injury in aircraft crash in January 1941	April 4, 1941	ditto	Nov. 1941: Slight epiphora in cold wind
29 L.A.C. C. W. A., 27 years	Injury to face by control column in a forced landing. Persistent R. epiphora since that time. Probed without cure	Sept. 19, 1941 (fracture seen at operation)	ditto	—
30 Sgt. F. A., 22 years	A/c. crash June 9, 1940. Watering of L. eye since that date	Oct. 4, 1941 (fracture seen at operation) Dec. 1, 1941	ditto	—
31 A.L.A. J. H. ...	A/c. crash June 3, 1941. Watering of R. eye since that date, with regurgitation from right sac	Jan. 9, 1942	ditto	—
32 Sgt. V. S., 28 years	A/c. crash July 14, 1941. Watering of L. eye since that date, with regurgitation from left sac	Feb. 13, 1942	ditto	—
33 F.O. A., 23 years ...	A/c. crash Sept. 23, 1941. Watering of L. eye since that date, with regurgitation from L. sac		ditto	—

TABLE OF CASES. II.—TRAUMATIC CASES (i) *Aircraft Crashes—continued*

Name, Rank and Age	History	Date of Operation	Result	Follow-up
34 L.A.C. A. H. H., 28 years	A/c. crash August 13, 1942. Watering of R. eye since that date, with regurgitation from right sac.	Feb. 24, 1943	No epiphora; passage clear	—
35 Sgt. R. W., 20 years	A/c. crash August 18, 1942. Watering of R. eye since that date. Right duct probed April 1, 1943	April 17, 1943	ditto	—
36 W.O. H. K., 25 years	A/c. crash in Feb., 1944. Watering of L. eye since that date	Sept. 15, 1944	ditto	—
37 F.S. C., 21 years ...	A/c. crash August 13, 1944. Watering of R. eye since that date. One attack of acute dacryocystitis	Nov. 6, 1944. Partial myectomy of R. Inf. Oblique Muscle through same incision	ditto	—
38 F.Lt. R. P. de C., 24 years	A/c. crash, March 1943. Watering of R. eye since that date. "Excision of R. sac in Dec. 1943 and again in August, 1944	June 12, 1945	ditto	—
/ II. TRAUMATIC CASES—(ii) <i>Car and Motor-cycle Accidents</i>				
39 Sgt. D. D., 32 years	Car accident, June 24, 1941. Watering of R. eye since that date	Sept. 24, 1941	ditto	8-11-41: Satisfactory. No watering
40 Sgt. W. H., 24 years	Car accident, May 6, 1942. Watering of both eyes since that date. <i>Has had bilateral dacryo-cysto-rhinostomy, but watering persists, with regurgitation from both sacs</i>	April 3, 1943 (R.) April 27, 1943 (L.)	No epiphora; passages clear	—
41 L.A.C. G. A. R., 28 years	Motor-cycle accident, Dec., 1940. Watering of L. eye since that date, with regurgitation from left sac	May 21, 1942	No epiphora; passage clear	—

II. TRAUMATIC CASES—(iii) *Sequelae of Nasal Operations*

Name, Rank and Age	History	Date of Operation	Result	Follow-up
42 AC. J. G., 30 years	Nasal operation in 1926. Watering of L. eye since that time. Has been probed, and had "Excision" of the <i>L. lacrimal sac</i>	June 30, 1941	No epiphora; passage clear	19-9-41: Slight recurrence of epiphora. Syringed with satisfactory result
43 P.O. R. B. S., 24 years	Left Caldwell Luc Operation, 1942. Left epiphora from that time, and regurgitation from left sac	Jan. 26, 1944	ditto	—
44 Sgt. K. G. M., 27 years	Bilateral Caldwell Luc Operation in 1935. Watering of both eyes since that time	Oct. 16, 1944 (L.) Oct. 27, 1944 (R.)	No epiphora; passages clear	3-3-45: Satisfactory. No watering
II. TRAUMATIC CASES—(iv) <i>Other Trauma</i>				
45 AC. D. D. B. H., 24 years	Accident of unspecified type to head in 1925. Left epiphora since that time.	March 10, 1941	No epiphora; passage clear	—
46 W.O.R.L., 41 years	Acute dacryocystitis in Feb., 1941. Injury to L. side of face in childhood, and resulting L. epiphora. <i>L. sac</i> "excised" in 1940	Sept. 18, 1941 (external ethmoidectomy at same operation June 22, 1942)	ditto	—
47 AC. E. B., 26 years	Left Inferior canaliculotomy in 1917, with resulting epiphora, which has continued	ditto	ditto	—
48 L.A.C. S. P., 25 years	Accident to L. side of face in 1934. Watering of L. eye since that time, with regurgitation from L. sac	August 12, 1942	ditto	2-12-44: Successful. No symptoms
49 L.A.C. V. S., 21 years	Facial injuries, August 30, 1940. Watering of L. eye since that time. Left acute dacryocystitis in Feb., 1941, and <i>left sac was subsequently "excised."</i> Recent recurrence of regurgitation from left sac	April 28, 1943	ditto	—
50 L.A.C. A. G. L. ...	Injury to L. eye in Oct., 1942. Watering of L. eye, and regurgitation from left sac since that time. "Excision" of <i>L. sac</i> in Nov., 1942, repeated in June, 1943	Sept. 6 1944	ditto	30-11-44: (Serving Overseas)

The non-traumatic cases comprised 26 patients, and involved 30 operations. The aetiology of these cases is a matter for surmise. In three of them, all unilateral cases, there was a history of onset of symptoms with an acute attack of dacryocystitis; but it is agreed that acute inflammation around the lacrimal sac is a result, and not a cause, of obstruction of the naso-lacrimal duct, and some constriction was probably present before the attack of acute inflammation occurred.

Few of the patients showed any abnormality of the nasal cavity. This fact agrees with what one would expect, since the obstruction usually occurs at the junction of the sac and the naso-lacrimal duct.

Two of the cases had accompanying ethmoiditis, and twelve exhibited a mucocele of the lacrimal sac. It is possible that a chronic inflammation of the lacrimal sac induces the constriction of the duct.

A satisfactory result was obtained in a case in which the nose was filled with nasal polypi. A combined external ethmoidectomy and dacryo-cysto-rhinostomy was performed. This necessitated sacrificing the posterior nasal flap, the posterior lacrimal flap being sutured to the orbital periosteum. A month after the operation the patient's nose was clean, free of polypi and discharge and the epiphora had disappeared.

The traumatic cases numbered twenty-four, two of which were bilateral, and the total operations numbered twenty-six.

In eleven cases of this group, there was a mucocele of the lacrimal sac, and in three, a history of acute dacryocystitis. In this series, the non-traumatic and traumatic cases show almost equal incidence, but, in view of the increased liability to injury of certain members of the Royal Air Force in time of war, it is probable that, under peace-time conditions, the traumatic cases would be in a minority.

Ten of the total series of operations were performed after one or more attempts at excision of the lacrimal sac, and six after attempts at an anastomotic operation, had been made elsewhere.

Fifty-three of the fifty-six operations under review were completely successful, and the patients concerned were discharged from hospital symptom-less, and with free passage from the inferior punctum to the nose; while three, including one case where there was obstruction of the inferior canaliculus with a patent superior canaliculus, showed varying amounts of epiphora.

An attempted follow-up of these 56 operation cases, for periods up to four years after discharge of the patient from hospital, was successful only in 23 instances, some of the personnel being inaccessible owing to overseas service, others having been released from the Service for reasons unrelated to their eyes, and a few having been killed on active service.

In eighteen of the twenty-three operation cases followed up,

a report was received stating that there was complete freedom from ocular symptoms, and great satisfaction was expressed upon the result of the operation.

Mild epiphora in cold wind, but not amounting to a serious disability, was reported in three cases; and, of these, only one was a case of straightforward, primary traumatic lesion—one being a case in which previous dacryocystectomy had been performed, and one a case in which there had been an attempted dacryo-cysto-rhinostomy previously.

One case, in which the lacrimal sac had previously been totally excised, showed recurrence of symptoms within one month of operation. No sac remnant had been found, and an effort had been made to suture the canaliculi into the nasal mucous membrane. Syringing and probing did not remedy the condition, but relief was attained after excision of the palpebral portion of the lacrimal gland.

One case showed no improvement of symptoms because the inferior canaliculus was obstructed. The operation, however, was technically successful, because the passage was patent when syringed through the upper punctum. Relief also followed excision of the palpebral portion of the lacrimal gland.

It is demonstrated, therefore, that of the cases followed up, eighteen of the operations performed (78 per cent.), resulted in complete freedom from symptoms; three, (13 per cent.), resulted in much improvement, and in two instances, (9 per cent.), there was no improvement.

It should be emphasized that, of the five cases in which full success was not attained, only one was quite straightforward.

Loss of patency of the inferior canaliculus should be regarded as a contra-indication to this method of treatment.

In thirty of the cases, the patients concerned were not traced by follow-up, but they were all symptom-free, with clear drainage, when discharged from hospital, and it is reasonable to suppose that no serious recurrence of epiphora was reported, or the case would have been referred back to us.

On two occasions, the operation was combined with external ethmoidectomy, and, on one occasion, with partial myectomy of the inferior oblique muscle, with satisfactory results.

Comments

Epiphora which exists over a long period is a severe disability. It causes an eczematous condition of the skin of the inner end of the lower lid. Dermal fibrosis and contracture follow, with resulting ectropion and constriction of the inferior punctum. These are additional causes of epiphora, and it is desirable, therefore, that steps should be undertaken to cure the condition as soon as possible, if the best results are to be obtained.

The operation of dacryo-cysto-rhinostomy is the treatment of choice. It retains the hydrostatic principles of lacrimal drainage, and the complete cure which follows its immediate performance in cases of traumatic obstruction of the naso-lacrimal duct, proves its value.

The operation of dacryo-cystectomy, so frequently employed in the treatment of mucocele of the lacrimal sac, is, in our experience, sometimes incompletely performed. The retained mucous membrane appears to continue the secretion of mucus, which, not being absorbed, becomes surrounded by a fibrous tissue capsule, the inner surface of which is lined by columnar epithelium. This "pseudo lacrimal sac" is usually in continuity with the inferior canaliculus, and may be employed instead of the normal sac in the operation of dacryo-cysto-rhinostomy.

Sometimes the "pseudo lacrimal sac" contracts when its contents are drained, and some constriction of the passage may result. A patent inferior canaliculus is an essential part of lacrimal drainage, the upper canaliculus appearing to play no part in this function. Obstruction of the lower canaliculus, therefore, contra-indicates the anastomosis operation. Previous attempted drainage of the lacrimal sac into the nose does not prejudice the results of dacryo-cysto-rhinostomy by the method herein described, and a more satisfactory result is obtained from a reformation of the anastomosis than from excision of the sac.

We have had no experience of the treatment of naso-lacrimal obstruction in children, except by probing in infantile cases, and we are not able to assess the place held by dacryo-cysto-rhinostomy in its treatment, but we wish to place on record our experience of its success in adult cases, where the only contra-indications are:—

- (a) Previous *complete* excision of the lacrimal sac. (N.B. This can usually be determined only at operation.)
- (b) Destruction of the inferior canaliculus.
- (c) Obstruction of the naso-lacrimal duct, due to tuberculosis, or malignant neoplasm, and, in most cases,
- (d) Atrophic rhinitis.

Summary

1. A description is given of a technique employed in the operation of dacryo-cysto-rhinostomy.
2. Records are reproduced of 56 instances in which the operation has been performed.
3. The cases are analysed to show the satisfactory results obtained by this procedure, even in cases in which previous surgical intervention has been carried out.
4. The aetiology and symptomatology of naso-lacrimal obstruction are discussed.

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ANNOTATIONS

Undergraduate Teaching of Ophthalmology

The curriculum of the medical student is again under critical examination by those interested in undergraduate teaching. Justifiable uneasiness is felt at the vast increasing amount of facts that the student is being called upon to remember often at the expense of making him a well educated man, able to think, deduce, sift, comment, criticise and arrive at a sensible conclusion about matters in and related to his professional work. The trend of the excessive forcing of facts into his mind during the short period of his training is to make the majority parrot-like, inadequately equipped for independent thought and judgment.

In hospital practice he sees among the in-patients a number of rare diseases which he may not meet again. Beds are occupied for long periods by patients suffering from obscure anaemias of academic interest only, and other rare disorders and of little value in preparing the general practitioner for his life's work. Probably in the out-patient department he sees more of the types of case he will have to treat in practice. This is so of the commoner eye diseases. In most teaching hospitals he attends the eye department once a week for three months, about twelve possible attendances in all of which two may be spent on holiday, and a third or fourth at either a football or cricket match.

In large medical schools the size of the class may be between 20