I have thought it worth while to publish these observations as at all events of interest in reference to Mr. Fisher's suggestion. Personally I am of opinion that they strongly support his view. There can be no doubt that in each of these cases the sella Turcica is abnormal. But it is obvious that much work will have to be done and many observations made especially as to the condition of the fossa in normal cases, as well as in cases of Leber's disease, before any definite conclusions can be arrived at, and it may be remarked that the published cases of Leber's atrophy, almost certainly include cases which are referable to more than one category.

INTRANASAL DACRYOCYSTOSTOMY:
INTRANASAL DRAINAGE OF THE LACRIMAL SAC

A Report of 50 Consecutive Cases

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The effective treatment of disease of the lacrimal passages has always presented difficulties to the surgeon. This is specially true in the case of hospital patients, who very often do not come for treatment until the disease has reached an aggravated and intense form. In very many of these cases there is great dilatation of the sac with regurgitation of muco-pus on pressure, or there is tear sac abscess, the result of the spread of the septic process to the tissues round the sac.

The old treatment of dilating the tear passages by frequent probing is in nearly all cases quite ineffective.

While a fairly large probe can usually be passed into the nose, adequate drainage is not established, and little or no lasting benefit results. Attempts made to secure better drainage by the wearing of styles, or by the introduction of threads to act as drains, have been made on a fairly large scale by some surgeons. This type of treatment, however, has never been very widely adopted, partly, I think, owing to the trouble it involves, and partly to its success being very moderate.

So troublesome are these cases of dacryocystitis that most ophthalmic surgeons have welcomed and largely employed the drastic method of complete excision of the tear sac.
The operation of excision, when properly carried out, gives very good results, marks a great advance and shows a determination to treat these cases with thoroughness. The operation, however, is obviously not an ideal one, its aim being to remove the diseased tear sac and not to establish drainage into the nose and restore the function of the parts involved.

After excision of the sac a certain amount of watering of the eye nearly always exists and sometimes this watering is very troublesome. It is true that the watering is often less than before the operation, but still it is very likely to be a lifelong source of annoyance to the patient.

To minimize this difficulty, excision of the accessory tear gland has been largely practised on the Continent.

The scar left after excision is usually trivial and only occasionally unsightly. Why, then, with results relatively so good should we advocate any revision of our surgical ideas on the subject? My answer is that, in my experience, the intra-nasal operation has in Dr. Fraser's hands given results very much better than excision. Real cure of the condition with complete restoration of function is obtained.

The patients' testimony to the complete curative effect of the intra-nasal operation is most striking. Watering ceases from the very day of the operation, and, as far as we have seen, the result is permanent.

At first, cases which seemed specially suitable were mainly chosen for the operation. Experience showed that cases with hugely distended tear sacs, or with abscess and fistula, were equally suitable.

The case of children presents greater difficulties. For them general anaesthesia is necessary, and a greater drawback is the increased technical difficulty of the operation owing to lack of room in the nose.

In children palliative treatment, such as the passage of probes, is, in my experience, much more likely to prove successful than in adults.

After carefully watching the results achieved by this intra-nasal operation, I feel confident that this method of treatment will eventually be widely adopted.

Personally, I feel inclined to leave the operation in the hands of a highly trained rhinologist; but no doubt many keen young ophthalmic surgeons will take the trouble to acquire the necessary technical experience and dexterity required for its performance.

With regard to this series of cases my sole function was to provide Dr. Fraser with suitable material and give my candid criticism on the operative results obtained. J. V. P.

An analysis of the 50 cases gives the following results:

Sex.—43 of the patients were females and only 7 males.
Age in decades.—  1 to 9 years = 2 cases
                       10 to 19 " " = 6
                       20 to 29 " " = 3
                       30 to 39 " " = 9
                       40 to 49 " " = 12
                       50 to 59 " " = 8
                       60 to 69 " " = 5

In 5 cases the ages were not given.

Side.—In 4 patients the condition was bilateral. The right side only was affected in 19 cases, and the left side only in 27 cases.

Duration.—This varied from five weeks to ten years, the average duration of the trouble being about three years.

Causation.—In the majority of the cases no cause was stated. One patient said that the trouble had come on after scarlet fever, while another patient blamed whooping cough. Another patient informed us that her mother and sister had a similar trouble. In at least 2 cases the patients blamed a blow in the region of the eye as the cause of the trouble in the tear sac. It is interesting to note that of the 50 cases operated upon, only 4 occurred in private practice, i.e., 8 per cent. On inquiring from the Acting Superintendent of the Royal Infirmary, the writers were informed that probably about 80 per cent. of the population of Edinburgh and the South East of Scotland (from which the Infirmary mainly draws its clientele) would come to charitable institutions such as the Royal Infirmary for minor operations like intranasal drainage of the tear sac. According to this calculation, 10 of the 50 cases, instead of 4, should have been operated on as private patients. It would thus appear that chronic purulent dacryocystitis is not only absolutely, but also relatively, more common among the poorer sections of the community than among the more wealthy.

Previous treatment.—The majority of the patients had been previously treated in the Eye Department by dilatation of the punctum and canaliculus, washing out the tear sac and the passage of probes into the nose. In at least 18 cases the patient had suffered from abscesses around the tear sac. Four patients had had the nose operated upon (turbinotomy) before West’s operation was performed.

Condition of the nose.—In 27 cases the nose was normal, though in 5 of these it was remarked that the tubercle of the septum appeared to be swollen. The other 23 cases showed the following conditions:—Deviation of septum, obstructing both sides of the nose, 1 case; deviation of septum to side of tear sac trouble, 5 cases; deviation of septum to side opposite that of tear sac trouble, 2 cases; perforation of septum, 2 cases; inferior turbinal enlargement, 2 cases; general hypertrophic nasal catarrh, 4 cases; large middle turbinals containing air cells, 2 cases; polypoid
middle turbinals with ethmoiditis, 3 cases; purulent rhinitis, 1 case; atrophic rhinitis, 3 cases; antro-choanal polypus and syphilitic lesion of lateral wall of nose, 1 case; perforation of the hard palate, 1 case. The general conclusion come to was that slight intranasal abnormalities had little or nothing to do with the commencement of the tear sac trouble. The findings, however, do not negative the view that the dacryocystitis had originally been due to infection passing up the nasal duct from the nose.

**Tear Sac.**—In 7 cases an abscess round the sac was present at the time of operation. The majority of the other cases showed considerable dilatation of the tear sac (in one case, No. 26, the sac was so dilated as to extend outwards beyond the middle of the lower border of the orbit) and in all muco-pus or pus could be squeezed out at the punctum on pressure over the sac. In several cases the patients remarked that the tear sac trouble became acute from time to time, with comparatively quiet intervals.

**Technique.**—The operator makes no claim to any "method" of his own. The technique finally adopted is merely a modification of that described by Paterson, of Cardiff, in the *Journal of Laryngology, Rhinology and Otology*, 1914, p. 169, but where the nasal septum is markedly deviated to the affected side it is necessary as a preliminary to perform the submucous resection operation. This may be done a week or two before the tear sac is dealt with, but the operator has always carried out both procedures at the same sitting in the small number of cases in which the septum operation proved necessary.

In the first ten or twelve cases the outer end of the canaliculus was slit by Dr. Paterson or Dr. Traquair before the tear sac operation. Later, as experience was gained, the operator carried out this small procedure himself, but during the last year he has entirely given it up as he finds that it is not necessary. All that is required is to cocainise the conjunctival sac before operation, and, after the tear sac has been exposed from within the nose, to dilate the punctum and pass a lacrymal probe along the canaliculus into the sac.

In children a general anaesthetic is advisable. Even adult patients complain of the removal of the bone with the gouge and hammer. Whether general anaesthesia is employed or not, the patient is given an injection of heroin and atropin about half an hour before operation, and the region in front of the anterior end of the middle turbinal is packed with strips of narrow gauze wrung out of 10 per cent. cocain and adrenalin (five drops of adrenalin to 55 of cocain.) If general anaesthesia is employed, as in children, only five per cent. cocain is used. The patient is now taken back to bed for half an hour, and is then removed to the operating table. There the intranasal packing is taken out and, with the aid of a nasal speculum and good reflected light, the mucosa covering the
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inner surface of the frontal process of the superior maxilla is injected with 1 per cent. novocain and adrenalin (novocain 20 minims and adrenalin 1 minim). From five to ten minutes later a D-shaped incision is made in this region (Fig. 1)—the curved portion of the incision anteriorly and the straight portion posteriorly—just in front of the anterior end of the middle turbinal. With the sharp periosteum elevator this flap of mucous membrane is raised up and removed with forceps, exposing the inner surface of the frontal process over an area about half the size of the finger nail. With the gouge and hammer the bone in this area is removed, exposing the lacrimal sac, which is dilated in the majority of these cases and bulges inwards towards the nose (Fig. 2). Occasionally one has to remove a portion of the anterior end of the middle turbinal, but as a rule this is not necessary. Sometimes the most anterior of the ethmoidal air cells is opened up during the removal of the bone, but this does not complicate the operation as the thin pink lining membrane of the air cell is not likely to be mistaken for the dense bluish-white wall of the tear sac. The greatest difficulty met with is in those cases in which the bone of the frontal process is very thick. It is no good being too gentle as the bone must come away, and slight taps with the hammer only prolong the operation. When a sufficient area of the sac has been exposed, a small piece of gauze wrung out of 10 per cent. cocain and adrenalin solution is packed into the region, and the intranasal operation temporarily abandoned, while the punctum is being dilated and the lacrimal probe passed into the sac. The nasal speculum is now introduced again, the gauze removed from the nose, and the inner wall of the sac made to bulge inwards by pressure on the lacrimal probe, carried out by an assistant or nurse (Fig. 3). The sac is next incised with a small, sharp-pointed, curved knife, as far forward as possible (Fig. 4). A pair of double cutting forceps is now introduced, so that the female blade lies inside the sac, while the male blade lies against the inner wall of the sac. On closing the forceps a piece of the inner wall is punched out (Fig. 5). One finds that pressure kept up with the lacrimal probe, after the sac has been opened with the knife, causes the incision to gape, and facilitates the entrance of the female blade of the forceps into the sac. As an alternative to the use of forceps one may, after opening the sac as described above, grasp the inner wall with Paterson’s long mouse-toothed forceps. The inner wall is then drawn inwards towards the nasal septum, and excised with the small curved bistoury. This latter procedure is only suitable in a fairly roomy nose (Fig. 6).

The operator makes no attempt to replace the original flap of nasal mucous membrane, and does not find that there is any tendency to dryness or crusting in the region of the operation.
Fig. 1. The D-shaped area of mucous membrane has been removed, the inner surface of the frontal process of the left superior maxilla exposed and the gouge applied.

Fig. 2. The bone exposed has been removed and the dilated tear sac bulges into the wound.

Fig. 3. A lacrimal probe is now passed through the lower punctum and canaliculus into the sac and pressed against the inner wall so as to "tent" it.

Fig. 4. While the sac is "tented" inwards a long bistoury is used to incise the inner wall.

Fig. 5. With the probe still in position, the "female" blade of a small nasal "double cutting" forceps is introduced into the sac. On closing the blades a portion of the inner wall of the sac is removed.

Fig. 6. As an alternative to the procedure indicated in Fig. 5, the inner wall of the opened sac may be grasped with Paterson's mouse-tooth forceps and drawn inwards to facilitate its excision with the small curved bistoury as shown above.
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There is, of course, some bleeding from the nose an hour or so after operation, when the effects of the local anaesthetic have passed off. Further, as is usual after nasal operations in which cocain and adrenalin have been used, there is considerable obstruction of the nose on the side of operation for two or three days.

Remarks.—In one case the anterior ethmoidal cells were diseased, and were opened up and cleaned out at the time of the operation on the tear sac. In only one case was it found impossible to expose the sac sufficiently by the intranasal route. (The patient was a builder, and the trouble in the tear sac had followed injury to the lower part of the forehead and root of the nose, due to the fall of a heavy stone lintel on this region. At operation it was found that the bone of the frontal process of the superior maxilla was so thick that the inner wall of the tear sac could not be sufficiently exposed.) Opening of the sac was almost invariably accompanied by a very free escape of pus into the nose. In several cases the pus had an extremely foul odour. In about a quarter of the cases the operation was rendered somewhat difficult on account of the narrowness of the nose, and in three the submucous operation was performed immediately before the operation on the tear sac. In seven cases the bone of the frontal process of the superior maxilla was very thick. In one case there was considerable bleeding from the anterior part of the incision in the nasal mucous membrane, and the local application of adrenalin did little good. When, however, the facial artery on the same side was compressed by an assistant, the bleeding was at once controlled, so that the operation could be completed successfully.

One case appears to be of special interest. The patient was a female of middle age, who suffered from antro-naso-choanal polypus on the left side. The left nasal cavity contained much pus. The patient had complained of pain over the left side of the face and trouble with the left tear sac for a year. This suggested the possibility of malignant disease. Operation was performed under general anaesthesia, the left tear sac being dealt with first of all. The radical operation on the left maxillary antrum was next performed and it was found that the cavity was full of pus and polypoid mucosa. The inner wall of the antrum had completely disappeared and the large choanal polypus was thus easily removed through the antral cavity and mouth wound. Tissue removed from the walls of the antrum was submitted to a pathologist who found giant cells and reported the condition as tuberculous. Subsequently, however, a history was obtained from the patient of syphilitic infection, and the Wassermann reaction proved positive. The patient made a good recovery, both from her antral and tear sac troubles.

In the majority of cases the operation only occupied from ten to fifteen minutes from the time of making the incision until the
inner wall of the sac had been freely removed and intrasal drainage established. In only a few instances did the operation extend to half an hour.

Complications.—The operation is followed by a little redness, swelling, and tenderness externally, in the region of the tear sac, in the majority of cases. In only four was there a sufficient amount of bleeding into the tissues to justify the use of the term "black eye" as a complication of the operation. In none of the cases were there any other disagreeable after-effects.

Stay in Hospital.—Seven of the patients did not stay in hospital at all but were operated upon as out-patients. Of the other 43 (with the exception of the case of the builder already mentioned, who was in hospital six weeks) the average stay in hospital was four days.

Results.—Of the 50 cases operated upon, 48 reported—24 in person and 24 by letter. The 24 patients who returned for inspection were seen by one or other of the writers at periods varying from three months to three years after operation; 19 of them were completely cured, i.e., there was no watering of the eye and no discharge of mucopurulent material on squeezing the sac, while the intranasal opening was free; 2 of the patients still complained of slight watering of the eye; while in 3 cases the operation had not been successful, i.e., there was discharge of muco-pus from the sac and closure of the opening into the nose. Two of these three cases were operated upon again. One was that of a child of five years and the second operation also proved unsuccessful as it was found to be impossible to make a free opening between the sac and the nose, mainly on account of the small space available. The other case was seen a month after the second operation, when the condition was entirely satisfactory. The third unsuccessful case was that of the builder already mentioned.

Twenty-four of the patients, who lived in the country, reported by letter. Of these, 19 stated that they were completely cured. One patient reported that there was still slight watering of the eye and one reported that the tears gathered at the inner corner of the eye, causing a slight swelling, and only passed into the nose when the "lump was squeezed." Three of the cases appear to have been comparative failures, i.e., the patients still complain of some purulent material gathering in the sac and of the tears running over the cheek.

If we take these two groups together, we find that of the 48 cases which reported, 38 may be regarded as complete cures (about 80 per cent.); 5 cases as considerably improved (10 per cent.); and 5 cases as comparative or complete failures (10 per cent.). J. S. F.

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