Dacryocystantrostomy

A preliminary report

By A. Belal, Jr., Alexandria, Egypt

Two thousand years ago, the lacrimal sac operation was performed in a crude fashion, forgotten and neglected for centuries, and then revived again by Toti (1904).

The operation was performed by Celsus in the first century A.D., in the second by Archigenes, and in the seventh century by Eginstoe (After Wolf, 1946). In 1904, Toti of Italy described his technique of dacryocystorhinostomy through an external incision in which the inner half of the lacrimal sac was removed and a corresponding area of the nasal mucous membrane was cut out.

West (1909) and Polyak (1912) were the first to perform dacryostomy through the nose with the idea of avoiding the scar. Their operation consisted of perforating the lacrimal sac from within the nose outwards. Many modifications of the external and the endonasal techniques have followed (Mosher, 1921; Arruga, 1964; and Iliff, 1971).

The endonasal technique was abandoned by the ophthalmologists mainly because of their unfamiliarity with nasal anatomy. The external approach carried the risk of a scar, hematoma formation, injury to the lacrimal canaliculi, stitch abscess and keloids.

Von Eiken (cited by Sauer, 1939) had previously reported draining the tear sac into the maxillary sinus. Goto (1968) described a new technique for draining the lacrimal sac into the ethmoidal air cells and reported good results.

The purpose of this publication is to present a simple drainage technique of the tear sac into the maxillary sinus creating, in effect, a dacryocystantrostomy (Fig. 1a, b, c). This technique provides a well exposed operative field, and a dependant drainage through a wide anastomosis.

Anatomical considerations

The orbital extension of the maxillary sinus varies considerably. This depends on age, sex, heredity, infection, and metabolic factors. It usually reaches the middle of the medial orbital wall. The naso-lacrimal duct runs downwards and laterally in relation to the antero-superior extremity of the medial wall of the sinus. In its passage, it forms an elevation called

https://doi.org/10.1017/S0022215100082669 Published online by Cambridge University Press

https://doi.org/10.1017/S0022215100082669 Published online by Cambridge University Press

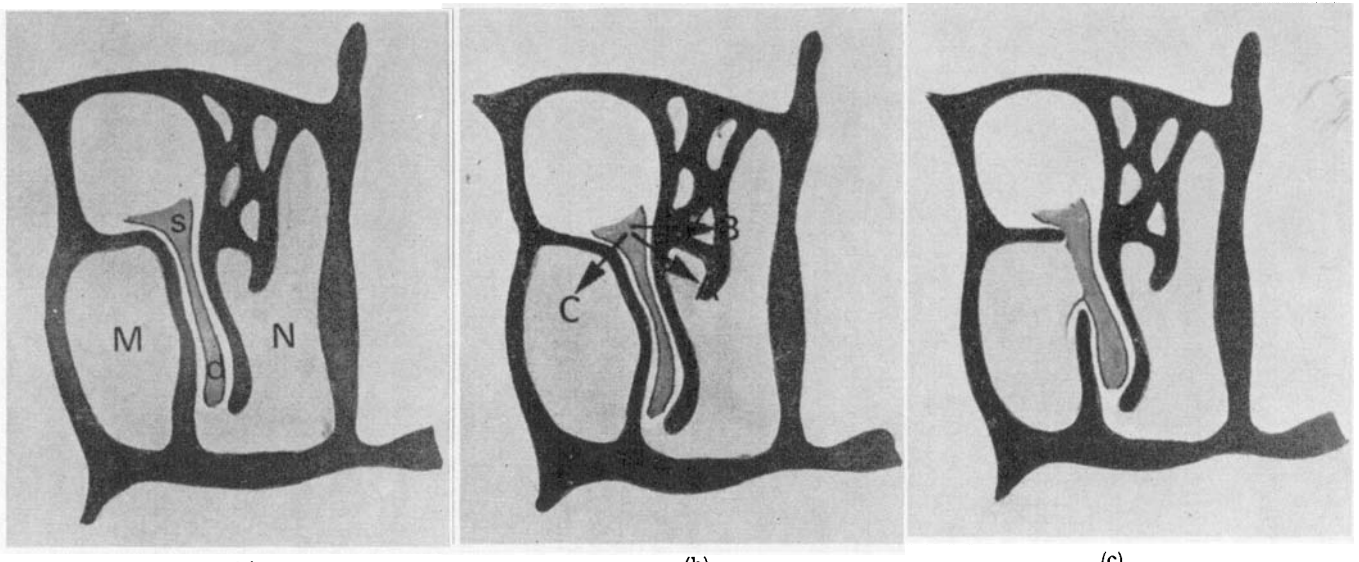


FIG. 1.

(a) Normal relationships at the anterior part of the maxillary sinus.
M: maxillary sinus.
N: nasal cavity.
s: lacrimal sac.
d: lacrimal duct

(b) Lacrimal sac drainage operations.
A: Dacryocystorhinostomy.
B: Dacryocystethmoidostomy.
C: Dacryocystantrostomy.

(c) Dacryocystantrostomy.

'the naso-lacrimal eminence'. The lacrimal sac is related to the antero-superior angle of the maxillary sinus.

Pre-operative evaluation

Complete ophthalmological examination, complete E.N.T. work-up as well as plain X-rays of the maxillary sinuses were done in every case. Sinusitis as detected by clinical examination or by X-rays, was treated pre-operatively by medications and by repeated antral washes, when necessary.

Technique

Anaesthesia. Either general or local anaesthesia can be used.

Patient's position. As in the ordinary Caldwell-Luc operation.

Surgeon's position. On the side to be operated.

Incision. Immediately above the gumline, extending medially as far as the mid-line and laterally as far as the second molar tooth. Periosteal elevation is carried out over the anterior wall of the maxillary sinus, as in the Caldwell-Luc operation. The infraorbital nerve is identified and the retractors are placed away from it (Fig. 2).

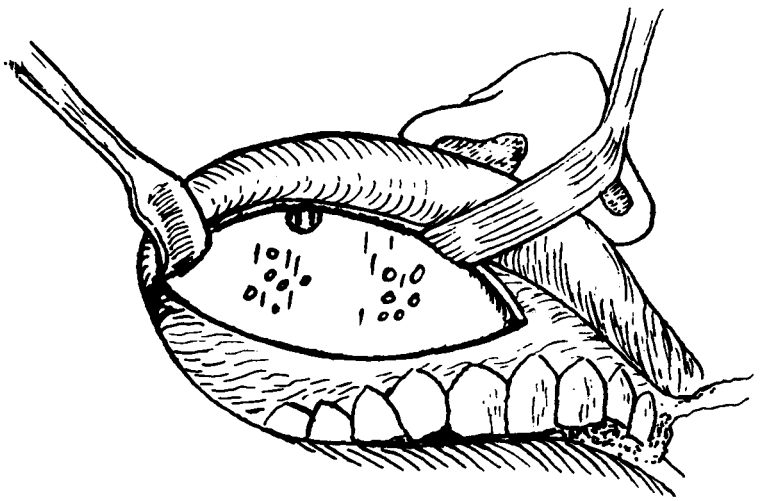


FIG. 2.
Exposure of the anterior sinus wall.

Removal of the anterior maxillary wall. The maxillary sinus is entered medial to the infra-orbital nerve, using either a chisel and hammer (Fig. 3) or a burr machine. The bony opening is enlarged using different sizes of burr ends (Fig. 4). Then the bone is removed as far as possible from the antero-superior angle of the sinus.

https://doi.org/10.1017/S0022215100082669 Published online by Cambridge University Press

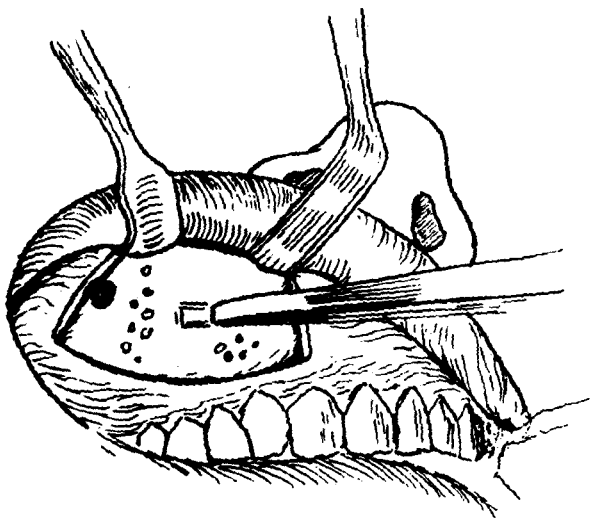


FIG. 3.
Removal of the anterior sinus wall.

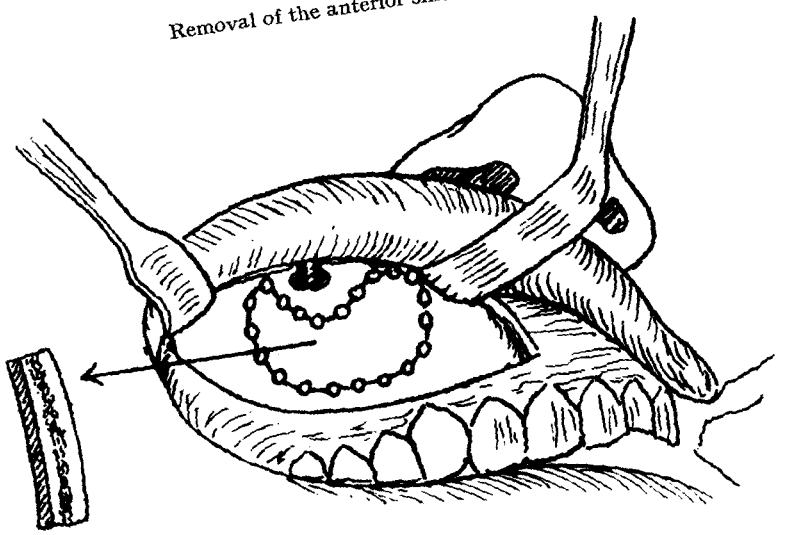


FIG. 4.
Extent of the sinus exposure.

Identification and exposure of the lacrimal sac. The naso-lacrimal eminence is identified in relation to the antero-medial wall of the sinus (Fig. 5). The operative microscope is used at this stage to facilitate the rest of the procedure. The mucous membrane over the medial wall of the sinus is incised and reflected posteriorly. Burring is started over the naso-lacrimal eminence, exposing its mucous membrane lining and is followed

https://doi.org/10.1017/S0022215100082669 Published online by Cambridge University Press

upwards until the lacrimal sac is exposed (Fig. 6). A lacrimal probe can be used at this stage to confirm the position of the sac and to facilitate incision of the mucous membrane.

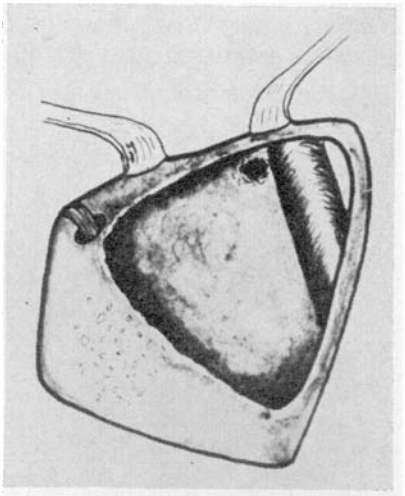


FIG. 5.
Identification of the naso-lacrimal eminence.

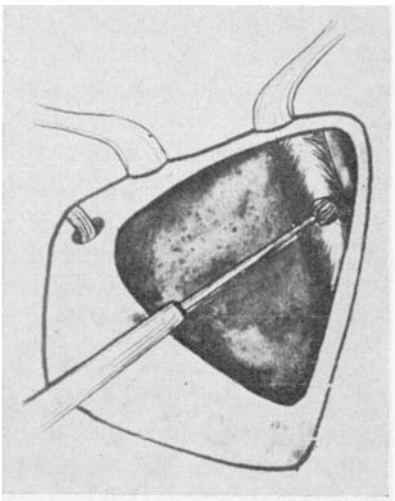


FIG. 6.
Exposure of the naso-lacrimal duct and sac.

Creation of the lacrimo-antral window. Using s sickle knife, an H-ncision is made in the exposed mucous membrane of the naso-lacrimal luct and sac (Fig. 7). The edges of the incision are exised, forming a large acrimo-antral anastomosis.

https://doi.org/10.1017/S0022215100082669 Published online by Cambridge University Press

Opening of the naso-antral window. A naso-antral window is fashioned under the inferior meatus in the usual way, as in the Caldwell-Luc operation. This window can be used post-operatively in the follow-up of the patient, and for antral wash-outs.

Closure. Antral packing is usually not necessary because of minimal bleeding. A few interrupted catgut sutures are inserted loosely in the gingiva to close the wound.

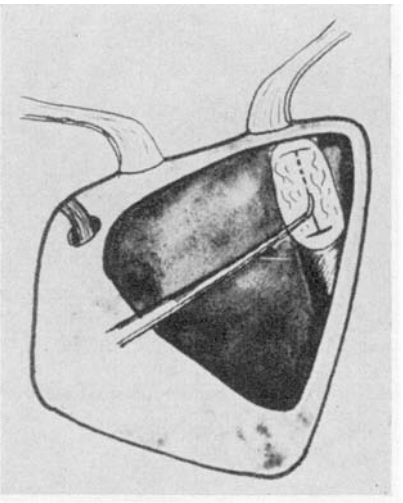


FIG. 7.
H-incision in the mucous membrane lining using a sickle knife.

Postoperative care

Patients are given a course of antibiotic for one week following the operation. Ice packs are placed over the side of the face operated on immediately following the surgery, for a period of 24 hours, to minimize postoperative oedema of the face. Antral lavage is started one day after the surgery, to clear blood clots and bone dust in the lacrimo-antral anastmosis.

Results

In an effort to evaluate this procedure, the results of five patients who underwent the operation during the last year were analysed. Of these patients, four were females and one was a male. The youngest patient was 18 years old and the oldest 55 years. The primary symptom which incapacitated the patients was epiphora. Two were diagnosed as chronic dacryocystitis, one as nasolacrimal duct obstruction and two presented by mucoceles of the lacrimal sac. The average duration of symptoms prior to surgery was 3 years, and the average follow-up of these cases was 8 months. Table I presents a clinical summary of the cases. For evaluation

https://doi.org/10.1017/S0022215100082669 Published online by Cambridge University Press

of the operative results, the patients were divided into three groups in which the procedure was considered either a success, a partial success, or a failure. If the patient had no further symptoms of epiphora six months following surgery, the procedure was considered a success. If the patient had one or more episodes of epiphora but had no further surgical procedures or need for continued medical therapy, it was considered a partial success. If the patient required another surgical procedure, or continued medical therapy, this was considered a failure. Four patients or 80 per cent had a successful operation, one or 20 per cent was improved, while none failed.

TABLE I

Case	Age	Clinical diagnosis	Treatment	Follow-up	Result
1	20 years	Chronic dacryocystitis	Dacryo-cystantrostomy	one year	Cured
2	20 years	Mucocele of lacrimal sac		9 months	Cured
3	18 years	Naso-lacrimal duct obstruction		9 months	Cured
4	50 years	Chronic dacryocystitis		7 months	Cured
5	55 years	Mucocele of lacrimal sac		7 months	Improved

Discussion

The dacryocystantrostomy operation offers an alternative method for draining the tear sac. Its usefulness as a first line of surgical treatment in such cases cannot be over-emphasized. This technique has the advantage of being a direct approach. The entire naso-lacrimal duct, and the floor of the lacrimal sac can be exposed. The field of vision is wide and the surgical microscope can be easily employed. The lacrimo-antral window can be enlarged inferiorly, hence its use in cases of naso-lacrimal duct stenosis resulting from intra-nasal diseases or operations. The field is almost bloodless, being away from the turbinates and the ethmoidal sinuses.

Obviously, the main advantage of this operation is the avoidance of a facial incision. There is no interference with the blood supply of the lids or with the medial palpebral ligament. A facial scar and the risk of hematoma or keloid formation can thus be avoided. The operation is relatively atraumatic and generally has a lower morbidity rate.

The lacrimo-antral window (Fig. 8) has numerous advantages over the lacrimo-nasal one. Drainage is better in the former because anastomosis is between the floor of the lacrimal sac and the maxillary sinus. The possibility of post-operative stenosis is less, because the antral window can be enlarged downwards under direct vision. Post-operative adhesions and granulation tissue formation are less frequently seen in the maxillary sinus because the mucous membrane is thinner and less vascular than the nasal one.

https://doi.org/10.1017/S0022215100082669 Published online by Cambridge University Press

The contra-indications of this operation are young age, frank purulent sinusitis and a non-pneumatized maxillary sinus. Removal of as small a piece as possible of the anterior maxillary wall would minimize the effects of such an operation on the facial growth in children. Purulent sinusitis can be treated by multiple wash-outs before the operation, or a radical antrostomy can be done at the time of the operation. Non-pneumatization of the maxillary sinuses was not seen in any of our cases and can usually be diagnosed by pre-operative radiology.

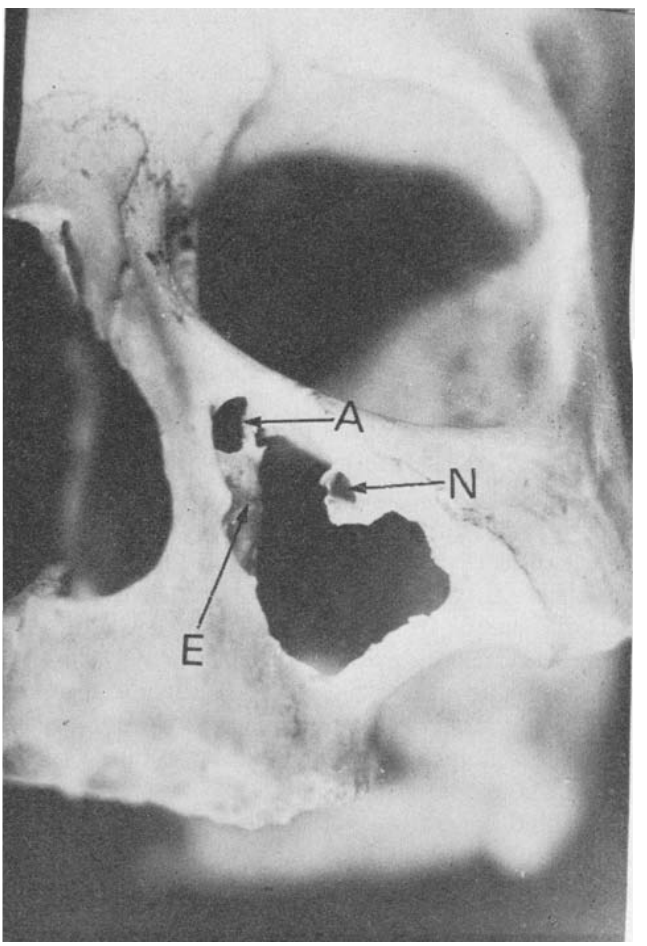


FIG. 8.
Lacrimo-antral anastomosis (A) in an articulated skull. The naso-lacrimal eminence (E and the infra-orbital nerve (N) can be seen.

Temporary infra-orbital neuralgia was the most common complication of the technique and usually disappeared within a few days of the surgery

https://doi.org/10.1017/S0022215100082669 Published online by Cambridge University Press

the pH changes inside the sinus as a result of the alkaline tears which followed the operation, did not cause chemical sinusitis in our cases.

Summary

A new operative technique is described in which the lacrimal sac is drained into the maxillary sinus. The advantages of the procedure, especially of avoiding a facial incision, are emphasized. Five patients suffering from long-standing epiphora underwent surgery. Two patients had chronic dacryocystitis. Two other patients presented with a mucocele of the lacrimal sac. In the fifth patient, there was obstruction in the naso-lacrimal duct. Short term follow-up results suggest its usefulness as a first line of surgical treatment in cases of epiphora due to obstruction in the lacrimal sac or the naso-lacrimal duct.

REFERENCES

ARRUGA, H. (1964) *Chirugie occulaire*, p. 261. Translated from 5th Spanish edition by J. D. Blum, Masson, Paris.
ILIFF, E. (1971) *Archives of Ophthalmology*, **85,** 586.
GOTO, T. (1968) *American Journal of Ophthalmology*, **65,** 68.
POLYAK, L. (1912) *Zeitschrift fur Augenth*, **27,** 92.
MONTGOMERY, W. (1971) *Surgery of Upper Respiratory System*, **2,** 53–64.
MOSHER, H. (1921) *Laryngoscope*, **31,** 492.
SAUER, W. (1939) *Archives of Otolaryngology*, **30,** 973.
TOTI, I (1904) *Clin Mod Pisa*, **10,** 385.
WEST, J. (1909) *Transactions of the American Ophthalmological Society*, **12,** 654.
WOLF, G. (1946) *Archives of Otolaryngology*, **43,** 344.
YANKAUER, S. (1912) *Laryngoscope*, **22,** 1331.

O.R.L. Department,
Alexandria Medical School,
Alexandria,
Egypt.

https://doi.org/10.1017/S0022215100082669 Published online by Cambridge University Press