

Endonasal Dacryocystorhinostomy - Our Experience

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ABSTRACT

In this study we present our experience with 32 patients, operated with one team consisting of (Nasal surgeon and Ophthalmologist) in Tripoli Medical Center, Tripoli, Libya.

In the last two decades the less invasive endonasal technique (WEST method), has replaced the classical external approach (TOTI method) in many medical centers especially after introduction of the magnifying medical instruments and machines like the microscope and the endoscope.

Main outcome measures: Success was defined as the resolving of the patient symptoms, unobstructed lacrimal system with irrigation and endoscopic visualization of a patent newostium.

A total of 32 consecutive microscopic and endoscopic endonasal dacryocysto rhinostomy (DCR) procedures performed between January 2006 and May 2007 were reviewed. In five cases combined nasal procedures was required. Four patients (12.5%) needed septoplasty operation and one patient (3%) needed removal of a rhinolith.

The success rate was 81.3%, there were 15.6% functional failures and one patient (3%) needed revision surgery due to recurrent granulation tissue formation at the new ostium region.

The follow-up period ranged from three months to two years. The procedure achieved 81.3 % success rate, in terms of symptom relief and anatomical success.

The described technique of endonasal dacryocystorhinostomy had a success rate comparable to that of external dacryocystorhinostomy. The ease of the operation and the smooth postoperative period with good results (over 80% successful rate), indicated that this surgery is taking a wider place in the management of the nasolacrimal diseases especially stenosis and dacryoceles, and accepted more and more by the ophthalmologists, ENT surgeons and the patients as well.

Keywords - Endonasal Dacryocystorhinostomy; Nasolacrimal duct stenosis.

INTRODUCTION

Toti first described the external dacryocystorhinostomy (DCR) in the early 20th century.¹ The technique is applicable to patients complaining of tearing and demonstrating obstruction of the lacrimal outflow system.

The procedure consists of creating a fistula directly from the lacrimal sac into the nose and bypassing the nasolacrimal duct (Figures 1 and 2)

Caldwell first described the endonasal approach to the lacrimal sac.² In 1911 West introduced it³, however, its use remained limited due to difficulties in visualizing the endonasal structures during the operation. The introduction of the microscopes and the rigid endoscopes provided the catalyst for endonasal dacryocystorhinostomy (DCR) (Figure 3).

We presented our experience with 32 patients operated between January 2006 to May 2007.

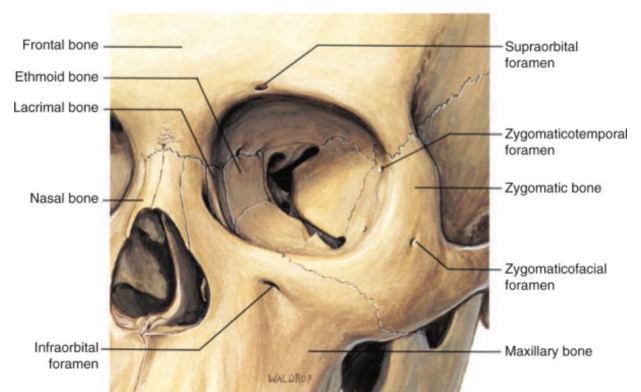


Figure 1: Orbital bones, frontal view.⁴

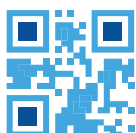




Figure 2: TOTI procedure, Lacrimal sac elevated from the fossa (medial).⁴

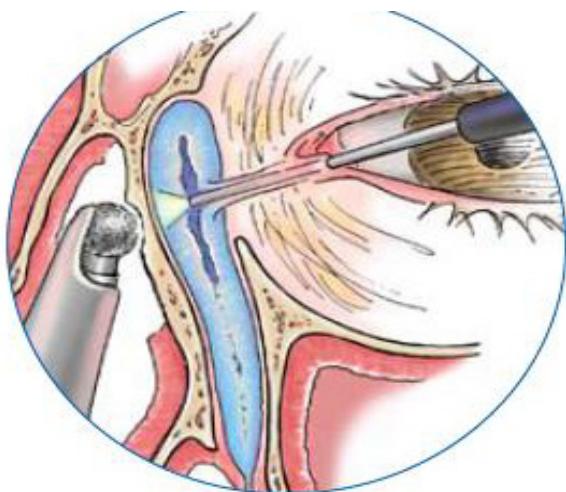


Figure 3: Endonasal DCR under light guide.⁵

MATERIALS AND METHODS

Between January 2006 and May 2007, 32 patients with nasolacrimal duct obstruction were treated consecutively by microscopic and endoscopic endonasal DCR. All patients were females. Patient's ages ranged from 22 to 70 years. Patients were usually referred by an ophthalmologist with a history of epiphora and nasolacrimal duct obstruction. All patients have either saccul or post-saccul stenosis.

There were three cases with dacryocoele, four cases required nasal septal surgery and one case with rhinolith required removal of the endonasal pathology during the surgery.

Pre-operatively, a detailed clinical examination was conducted by an ophthalmologist and an ENT surgeon, including regurgitation testing and lacrimal syringing and probing. Endoscopic evaluation was performed in every case, in order to check for access, deviated nasal septum, turbinate hypertrophy or any other associated pathology. All operations were done under patients general anesthesia.

The operation steps:

The nose was prepared using cotton strips soaked in 2% xylocaine and adrenaline 1:100,000, 10-15 minutes prior to surgery. This ensured adequate decongestion, mucosal anesthesia, easy access and a bloodless field. 2%

xylocaine with 1:100 000 adrenaline was submucosally injected into the lateral nasal wall, superior and anterior to the attachment of the middle turbinate, and then along the maxillary line. The ocular surface was anaesthetized with two drops of 4% xylocaine.

In all patients the endonasal route (West procedure) were used. In 25 (78%) of surgeries we use the Vario ZEISS Microscope for magnification, and in 7 patients (22%) we did use the 0 degree and 30 degree, 4 mm STORZ rigid endoscopes.

First elevation of the flap (Figures 4 and 5); an osteotomy was performed with straight Kerrison punch forceps. Sometimes, removal of thick bone from the frontal process of the maxilla was required, for which a drill with 1-2mm diamond burr was used. Lacrimal bone was removed with a Freer's elevator.

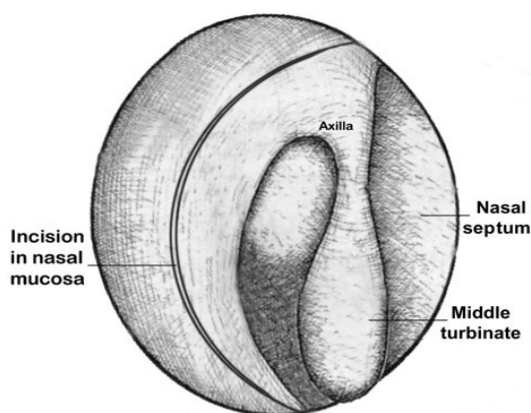


Figure 4: Incision to raise the mucosal flap, begun 8 mm above the axilla of the middle turbinate and extended 6 mm anterior to the axilla onto the frontal process of the maxilla.⁶

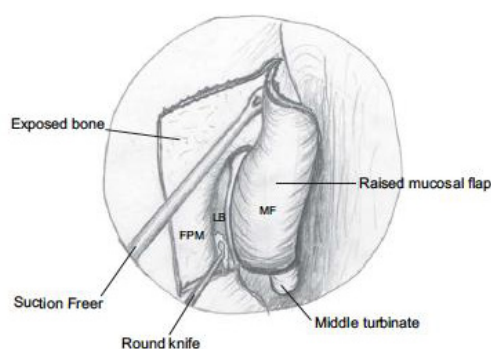


Figure 5: Elevation of the mucosal flap.⁶

At this point the ophthalmologist insert edtranscanalicular lacrimal probe through the inferior canaliculus to identify the medial wall of the sac, and/ or external pressure was exerted on the lateral wall just below the medial canthus area, causing the sac to protrude medially in the nasal cavity, and then the sac is opened and part of the medial wall of the sac is removed, syringing done and the silicone tube is inserted and knotted in the nose (Figure 6), soft



nasal pack used for 24 hours, in cases of septoplasty and rhinolith surgery, nasal splints for 7 days were used to prevent postoperative synechia.



Figure 6: Silicone tube knotted in place (intraoperative view).

Post-operative care and follow up:

Patients were discharged uneventfully either in the first or in the second postoperative day, and saline nasal drops and antibiotic eye drops were advised to avoid crust formation and in order to ensure continuous flow through the lacrimal system. Patients were advised to avoid nose blowing for one week, to decrease risk of nasal bleeding and orbital emphysema.

Patients were followed up after one week, one month, three months and six months after surgery. Endoscopic visualization of the nasal cavity was performed in order to remove crusts and granulations (if any) and to check the patency of the newly created ostium using lacrimal irrigation. The silicone tubes usually removed three months post surgery.

RESULTS

All patients seen 1, 3 and 6 months after surgery for evaluation, and in each visit they were examined by either ENT specialist or ophthalmologist or both.

In all patients the results were measured

- 1- Subjectively by questioning the patients.
- 2- Objectively by using the endoscope and examining the nasolacrimal sac region.

26 patients (81.3%) described that the surgery was successful and have no more tearing problems; in those patients the endoscopic examination is normal.

5 patients (15.6%) described the surgery was unsuccessful and they have still tearing problem, in the nasal endoscopy no specific cause was seen, and they are considered as functional failures.

In one failed surgery (3%) the cause of failure was a recurrent granulation formation over the tube in the new ostium region; this patient underwent a revision surgery later (Figure 7).

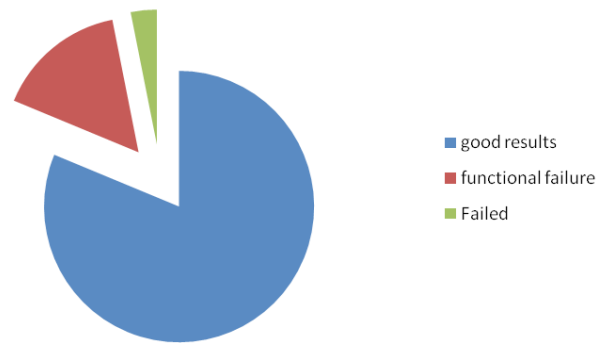


Figure 7: DCR results.

Complications

No major complications were noted.

Minor complications:

Two patients (6%) had intraoperative bleeding and were controlled with bipolar cautery and nasal packing.

Two patients (6%) had postoperative lid edema, which was resolved spontaneously (Figure 8).

As late complications three patients (9%) developed small nasal synechia, and all needed no therapy as there were no symptoms from it, and one patient (3%) developed recurrent granulation formation in the region of the new ostium, and this patient needed revision surgery later.

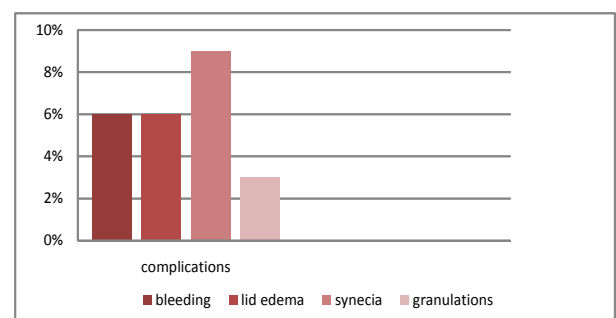


Figure 8: Shows complications.

DISCUSSION

Usually patients complaining from tearing (epiphora) seek the ophthalmological advice; this is an annoying symptom, which is embarrassing to the patient both socially and functionally.

Epiphora usually caused by either pre-saccal or post-saccal obstruction of the nasolacrimal duct and have two widely accepted surgical treatment modalities; external and endonasal DCR. Since Toti's¹ original description of DCR in 1904, external approach has been used for relief of the lacrimal obstruction. The success rate of external DCR has improved to the present days with few modifications, and may be up to 90-95% in the hands of a trained oculoplastic surgeon.

The advent of microscopic and endoscopic instrumentation for nasal and sinus surgical procedures has prompted renewed interest in the transnasal DCR.⁸ The transnasal



approach not only avoids an external incision and scar, but also enhances the surgeon's ability to identify and correct common intranasal causes of DCR failure, including adhesions, an enlarged middle turbinate, nasal septal deviation and paranasal sinus diseases.

The main advantage of external DCR is visualization of the anatomy, allowing precise removal of the bone in the lacrimal fossa and exact anastomosis of the nasal mucosa and lacrimal sac wall.

Endoscopic surgeons should have a good knowledge of the anatomy of the lacrimal sac and duct within the nose, in order to obtain optimum results comparable to those of external DCR.

Endonasal DCR has also been reported to be quicker than the traditional external approach, equivalently successful and preferred by patients.¹⁰

Other alternative is endonasal laser DCR, which is not the procedure of first preference, due to its high cost, long operation time and less satisfactory results. The inferior results achieved with laser DCR may be due to the size of the ostia created; Small ostia created by laser DCR have been found to have patency rates of only 64 to 70%.^{7,12}

Endoscopic DCR has many advantages over external DCR (e.g. avoidance of facial scarring, of disruption of lacrimal sac pump action from the orbicularis oculi muscle, and of division of the medial canthal ligament), and it is less traumatic, quicker and cosmetically more convenient, and has low complication rate, minimal morbidity and a success rate comparable to traditional external DCR.^{7,13}

The endoscopic approach provides excellent visualization and management of intranasal structures, and it may be associated with improved outcome, considering that intranasal synechiae and improper rhinostomy site placement are common causes of failure of external DCR.⁹

The most common causes of failure of endonasal DCR are false localisation of the lacrimal sac, granulation tissue formation, retained bony specula, inadequate removal of the medial sac wall, and synechiae between the lateral wall and the middle turbinate.

In our view, appropriate post-operative care is essential to prevent endonasal synechiae and subsequent recurrences. Kong *et al.*¹⁵ reported granulation at the internal nasal opening in approximately 50% of cases at eight weeks post-operatively.

Endoscopic endonasal DCR is a valid alternative to the traditional extranasal procedure. However, this technique does require a certain expertise in endoscopic surgery.

Adequate removal of bone; creating a flap of lacrimal sac mucosa and approximating it to the nasal mucosa; and regular post-operative endoscopic follow up to remove crusts, synechiae and granulations and creation of a wide surgical window helps ensure a success rate comparable to that of the external procedure.

In most cases, sophisticated equipment is not required and the procedure can be performed with just a few, routinely used endoscopic sinus surgery instruments,

In our study, we have found females predominance, which is higher than in the other studies.^{8,10,12,14} Our success rate in this study is 81.3%, which can be compared with other studies.^{10,12,13} Literature review showed that the success rate of endoscopic dacryocystorhinostomy varies between 80 to 95%.^{16,17}

We have in our series of 32 patient one clear functional and anatomical failure (3%), due to repeated granulation tissue formation. Meticulous cleaning of the granulation tissue at regular follow-up visits and regular use of saline sprays by the patients are essential to prevent granulation tissue and synechia formation, also use of the silicone tubes for three months should prevent early closure or synechia at the nasolacrimal sac region.

CONCLUSION

Endonasal DCR surgery offers a very attractive alternative to the well-established technique of external DCR surgery for the treatment of primary acquired nasolacrimal duct obstruction with equivalent success rates, shorter surgical time and higher patient satisfaction.

There was no statistically significant difference between endoscopic and external DCR, endoscopic surgery may have a benefit of preserving the lacrimal pump system and leaving no scar.

Patient preference and availability of each service should direct management; hence endonasal DCR surgery should be considered for primary treatment of nasolacrimal duct obstruction.

REFERENCES

1. Toti A (1904) A new conservative method of dacryocystorhinostomy for chronic suppuration of lacrimal sac [in Italian], *Clin Mod (Firenze)* **10**, 385-387.
2. Caldwell GW (1893) Two new operations for obstruction of the nasal duct, with preservation of the canaliculi, and with an incidental description of a new lacrimal probe, *Am J Ophthalmol.* **10**, 189-193
3. West JM (1909-11) A window resection of the nasal duct in cases of stenosis, *Trans Am Ophthalmol Soc.* **12**, 654-658.
4. Dutton JJ (1994) *Atlas of Clinical and Surgical Orbital Anatomy*. Philadelphia, WB Saunders.
5. Galloway T and Chang D (2013) Endoscopic DCR, page 2
6. Sonkhaya N and Mishra P (2009) Endoscopic transnasal dacryocystorhinostomy with nasal mucosal and posterior lacrimal sac flaps, *Journal of Laryngology and Otology* **123**, 320-326
7. Hartikainen J, Anttila J, Varpula M, Puukka P, Seppä H and Grenman R (1998) Prospective randomised comparison of endonasal endoscopic dacryocystorhinostomy and external dacryocystorhinostomy, *Laryngoscope* **108**, 1861-1866.



8. Metson R (1990) Endoscopic approach for revision dacryocystorhinostomy, *Laryngoscope* **100**, 1344-1347.
9. Metson R (2001) Dacryocystorhinostomy. In: Kennedy DW, Bolger WE, Zinreich SJ. Disease of the Sinuses, Diagnosis and Management. Hamilton: BC Decker pp.317-324.
10. Dolman PJ (2003) Comparison of external dacryocystorhinostomy with nonlaser endonasal dacryocystorhinostomy, *Ophthalmology* **110**, 78 - 84.
11. Onerci M (2002) Dacryocystorhinostomy. Diagnosis and treatment of nasolacrimal canal obstructions, *Rhinology* **40**, 49 - 65
12. Hehar SS, Jones NS and Sadiq A, Downes RN (1997) Endoscopic holmium: YAG laser dacryocystorhinostomy – safe and effective as a day case procedure, *J Laryngol Otol.* **111**, 1056-1059
13. Cokkeser Y, Evereklioglu C and Er H (2000) Comparative external versus endoscopic dacryocystorhinostomy: result in 115 patients (130 eyes), *Otolaryngol Head Neck Surg.* **123**, 488 - 491.
14. Onerci M, Orhan M, Ogretmenoglu O and Irkec M (2000) Long- term results and reasons for failure of intranasal endoscopic dacryocystorhinostomy, *Acta Otolaryngol* **120**, 319 - 322.
15. Kong YT, Kim TI and Kong BW (1994) A report of 131 cases of endoscopic laser lacrimal surgery, *Ophthalmology* **101**, 1793 - 1800.
16. Yung MN and Hardman Lea S (2002) Analysis of the results of surgical endoscopic dacryocystorhinostomy: Effect of the level of obstruction, *Br J Ophthalmol* **86**(7), 792-794.
17. Wormald PJ (2002) Powered endoscopic dacryocystorhinostomy, *Laryngoscope* **112**(1), 69-72.

