External versus endonasal dacryocystorhinostomy in a specialized lacrimal surgery center

Vinod Gauba, FRCOphth

Abstract

Purpose: To study the duration of surgery, outcomes, adverse events and success rates of external versus endonasal dacryocystorhinostomy (DCR) surgery in a specialized lacrimal surgery center.

Methods: Prospective, interventional case series. Standard external DCR technique was performed. Mechanical endonasal DCR was performed with enlargement of the ostium and full length opening of the lacrimal sac. Surgical time, duration of intubation, incidence of hemorrhage, infection, wound dehiscence; follow-up duration and functional success at the end of follow up were recorded.

Results: Functional success and symptomatic relief were equivalent in both procedures. Endonasal DCR surgery was found to be quicker to perform than external DCR surgery. The follow-up duration was comparable in both groups (mean 9 months). Patient satisfaction was significantly higher in the endonasal DCR group (9.3 versus 8.6).

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.

Keywords: DCR, External, Endoscopic, Epiphora, Success, Lacrimal

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Introduction

Dacryocystorhinostomy involves the creation of an alternative route for drainage of tears, between the lacrimal sac and nasal cavity, bypassing the nasolacrimal duct. This is usually performed either by an external approach (external DCR) or through the nasal cavity using an endoscope (endonasal DCR).

The external DCR technique was originally described in 1904 and was subsequently modified by the addition of suturing of the nasal and lacrimal mucosal flaps in order to form an epithelium-lined fistula. Several case series have estimated the success rate of external DCR to be between 85% and 95%.1,2

The endonasal approach was introduced in 1893 by Caldwell3 and later modified by West4 and Halle.5 During its early days, this approach failed to gain popularity due to lack of technology to allow good access to the nasal cavity. Following the introduction of the nasal endoscope,6 interest in endonasal DCR increased. The procedure, in its present form, was introduced by McDonough et al.7 The literature contains several figures of reported success rates ranging from 63% to 90%.8,9

The apparent advantages of endonasal DCR over external DCR are its less invasive nature, shorter operative time and preservation of pump function of the orbicularis oculi muscle due to the absence of an external skin and orbicularis
incision. Absence of an external scar, minimal morbidity and low complication rate have made endonasal DCR popular. The disadvantages of endonasal DCR include a relatively smaller opening between the lacrimal sac and nasal cavity, high equipment cost and steep learning curve and some of these disadvantages are known to influence the success rate. Despite the advantages, the general impression is that endonasal DCR has a lower success rate than external DCR. This study aims to look at this hypothesis further.

This study is a prospective interventional case series looking at the procedure, outcomes, adverse events, success rates and patient satisfaction with external and endonasal DCR surgery performed by a sub-specialized surgeon in a lacrimal surgery center.

Materials and methods

The study adheres to the tenets of Declaration of Helsinki. Prospective data collection was performed on external and endonasal DCR surgery. All procedures were performed by a single lacrimal surgeon (VG) and all cases had primary acquired nasolacrimal duct obstruction. The external DCR surgery was performed by the standard technique as referenced in the introduction. The mechanical endoscopic endonasal approach included enlargement of the bony ostium using a diamond burr, full length opening of the lacrimal sac and approximation of nasal and lacrimal sac mucosal edges. No sutures were used. Silicone intubation with internal silicone bolster was performed in all external and endonasal DCR cases. All cases were performed under general anesthesia. The surgeon was well experienced in both procedures prior to the start of this study.

Data recorded are as follows:

1. Surgical time (in minutes from LA administration to removal of drapes).
2. Symptomatic relief (1–4; 1 = no improvement; 2 = marginal improvement; 3 = considerable improvement; 4 = complete resolution of epiphora symptoms).
3. Post-operative visits-Functional Endoscopic Dye Test (FEDT) or visualization of fluorescein dye at the ostium (Fig. 1).
4. Intraoperative hemorrhage requiring intervention.
5. Post-operative (within 7 days) hemorrhage requiring intervention.
6. Infection.
7. Wound dehiscence.
8. Duration of Follow-up.
10. Patient satisfaction (1 = extremely dissatisfied to 10 = extremely satisfied).

The surgery was deemed as successful if at the last follow-up appointment the patient scored 3 or above for symptom resolution and had fluorescein dye visualization at the nasal opening (i.e. functionally patent).

Results

A total of 45 patients were included in the study. 22 of which underwent external DCR surgery and 23 underwent endonasal DCR surgery. Follow-up ranged from 3 to 14 months. The data were collected over a period of 3 years. Both groups were well matched for age and sex.

The results’ summary obtained for the 9 data points mentioned in the methods can be seen in Table 1. Graphical display of the results can be seen in Fig. 2 where series 1 is external DCR and series 2 is endonasal DCR. The graphical display indicates that both groups are comparable in all of the collected data points.

Further analysis of the results revealed that endonasal DCR surgery took significant less time to perform than external DCR surgery. There was no statistically significant difference in symptomatic relief in both groups. The post-operative visualization of fluorescein dye at the nasal opening was also comparable in both groups. A slightly higher incidence of intra-operative hemorrhage requiring intervention was noted in the external DCR group. Post-operative hemorrhage requiring intervention was similar in both groups. There was one case of cellulitis around the wound in the external DCR group whereas no cases of infection were noted in the endonasal group. No cases of wound dehiscence were noted in either group. The follow-up duration was comparable in both groups. Patient satisfaction was significantly higher in the endonasal group. The duration of silicone intubation was comparable in both groups.

Discussion

Endonasal DCR had gained increasing popularity and acceptance in the last decade for the treatment of primary
nasolacrimal duct obstruction. A strong driving force for this
decision in the Middle East and North Africa (MENA) region
is the general patient preference to avoid a facial scar partic-
ularly in such a patient cohort where keloid formation is not
infrequent.

Various interventional cohort studies have studied the suc-
cess of this technique compared to the traditional external
DCR. A retrospective cohort study comparing success rates
of endonasal (86 cases) and external (90 cases) DCR surgeries
found statistically significant success rates with endonasal
DCR (84% versus 70%, $P = 0.03$) at a mean follow-up period
of seven months. Çokkeser et al. also found comparable suc-
cess rates between external and endonasal DCR (90% versus
88%). Dolman et al. in a study looking at external DCR and
non-laser endonasal DCR, also found both procedures to
have equivalent success rates (90% versus 89%). His group
also found the nasal approach more rapid and more accept-
able to patients who had an alternative technique used on
the other side. Meanwhile a retrospective comparative co-
hort study found a higher success rate with external DCR
when compared to endonasal DCR (82% versus 58%). How-
ever, it also found that the rate of symptom relief was similar
in both groups.

This study suggests that both external and endonasal DCR
surgeries have a high success rate with low incidence of any
adverse events and high patient satisfaction and are gener-
ally comparable across all the measured parameters. The suc-
cess rates in both groups were found to be equivalent
meanwhile patient satisfaction was noted to be slightly high-
er with endonasal DCR surgery and this difference was sig-
ificant. The latter may be higher due to the shorter surgery
time; lack of external incision; quicker return to work and les-
sor follow-up appointments (no suture removal).

Surgical technique and meticulous attention to detail are
significant contributors to achieving a high success rate in
DCR surgery. Endonasal DCR surgery has a steeper learning
curve when compared to external DCR surgery. The results
obtained in this study may be partly due to the extensive
experience of the lacrimal surgeon in both procedures.

Conclusions

Endonasal DCR is a procedure of increasing interest due to
its minimally invasive nature, high patient satisfaction
and high success rates. This study suggests that both proce-
dures have a high success rate and are equivalent in produc-
sing symptomatic relief of epiphora. The shorter duration of
surgery, absence of any visible scar along with equivalent suc-
cess rates to external DCR surgery, make endonasal DCR a
highly attractive procedure for the treatment of primary
acquired nasolacrimal duct obstruction.

Conflict of interest

The authors declared that there is no conflict of interest.

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