

Comparison of Endonasal Endoscopic Dacryocystorhinostomy with External Dacryocystorhinostomy

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ABSTRACT

Purpose: To compare anatomical and functional success of Endonasal Dacryocystorhinostomy (DCR) with that of External Dacryocystorhinostomy.

Study Design: Quasi-experimental study.

Place and Duration of Study: Department of Ophthalmology and Otolaryngology, District Headquarter Teaching Hospital, Sahiwal, from July 2018 to July 2019.

Methods: Sixty patients with nasolacrimal duct obstruction were selected by convenient sampling technique and were divided into two groups. Group 1 underwent endonasal DCR while group 2 underwent external DCR. Detailed history with regard to symptoms and duration of the obstruction was taken. Detailed ophthalmological and otolaryngological examination was performed. Patients were followed up for three months. Chi-square test was used to compare the success between two groups. Confidence level of 95% was used and p value of less than 0.05 was considered significant.

Results: Male to female ratio was 4:11. The most common presenting symptoms was epiphora that was present in all patients. Regurgitation of lacrimal sac was present in 75%, conjunctivitis was present in 53.33% and dacryocystitis was present in 41.66% patients. Anatomical success rate for endonasal DCR was 25 (83.33%) and for external DCR was 27 (90%). Functional success rate for endonasal DCR was 23 (76.67%) and for external DCR was 22 (73.33%). There was no statistically significant difference in the short term success of surgery between the two groups.

Conclusion: Endonasal DCR offers minimal invasive approach with comparable anatomical and functional results to the external DCR.

Key Words: Conjunctivitis, Dacryocystorhinostomy, Dacryocystitis, Epiphora.

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INTRODUCTION

Tears have important role in ocular surface wellbeing.

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Drainage of tears from the conjunctival sac through the lacrimal passages into the nose is important as it prevents stagnation of the tears. Blockage in the drainage of tears through the lacrimal passages not only causes discomforting epiphora but it can also lead to infections.¹ Restoring patency of the lacrimal drainage system into the nose relieves the agonizing epiphora and stops occurrence of recurrent infections. Dacryocystorhinostomy (DCR) is creating a fistula between the lacrimal sac and the nasal cavity. For the

first time DCR was performed via intranasal approach in nineteenth century.² In the twentieth century DCR was performed by Toti by a novel technique. In that procedure external skin incision was used to approach the lacrimal sac and an opening was made to the nasal cavity.³ Endoscopic assisted transnasal DCR was first concocted by McDonogh and Meiring in 1989.⁴ With the development of better visualization systems, small gauge instruments and introduction of Lasers in the field of surgery, more emphasis is given towards minimally invasive surgical approaches. As a result, endonasal DCR is gaining popularity. With the increasing experience of the surgeons, results of endonasal DCR are coming close to the results of external DCR.⁵ Endonasal DCR offers the advantage of no skin scar, preservation of lacrimal part of orbicularis oculi, less operative time once the learning curve of surgeon has plateaued and faster recovery of the patient. Moreover, endonasal DCR can be done in the setting of active infection.⁶ External DCR is considered a gold standard. Its main advantages include no dependency on expensive instrumentation, lacrimal sac direct approach for examination, treatment of intra-sac pathologies and capability of creation and suturing of lacrimal sac and nasal mucosal flaps.⁷

In the current study we have compared success of endonasal DCR with that of conventional external DCR. The idea was to see whether Endonasal DCR is as promising a technique as external DCR with less morbidity to the patient and faster postoperative recovery.

METHODS

This prospective quasi-experimental study was conducted from July 2018 to July 2019. Departments of Ophthalmology and Otolaryngology of District Headquarter Teaching Hospital, Sahiwal, contributed to this study. Institutional review board approval was sought before the start of the study. Informed consent was taken from all the patients included in the study. Patients were selected from outpatient department of ophthalmology. Diagnosis of nasolacrimal duct obstruction was made on the basis of symptoms, presence of regurgitation test and by probing and syringing of the lacrimal passages. Inclusion criteria were patients with age ranging from 20 years to 60 years, both genders and presenting with chronic dacryocystitis. Exclusion criteria comprised of obstruction of lacrimal passages proximal to the

lacrimal sac, previous history of dacryocystorhinostomy, history of trauma, presence of nasal pathologies obstructing lacrimal drainage pathway, hypersecretion of tears, lower lid laxity manifested by lateral distraction of more than 5 mm, punctal eversion and conjunctivochalasis.

Detailed history was obtained from all the patients with respect to duration and severity of the symptoms. Detailed ophthalmological and otolaryngological examination were performed. CT scan of paranasal sinuses and orbit was obtained for all the patients. All the patients were operated under general anaesthesia.

Patients were divided into two groups. Group 1 patients were operated by endonasal approach while Group 2 patients were operated by external approach.

In the external DCR group, local infiltration of the medial canthus and lower lid region was done with 5 ml of 2% lidocaine and 1:100,000 epinephrine solution. Nasal cavity was packed with dressing soaked in a solution of 2% lidocaine and 1:100,000 epinephrine. Skin incision was given over the side of the nose 10 mm away from the medial canthus. Periosteum over the anterior lacrimal crest was approached by dissecting the soft tissue. Lacrimal sac was exposed by elevating the periosteum. Bone was removed with the help of Kerrison bone Rongeur. Lacrimal sac and nasal mucosal flaps were fashioned. Nasal packing was removed. Silicon tube was passed through the superior and inferior canaliculus into the nasal cavity and tied by square knots. Anterior flaps of lacrimal sac and nasal mucosa were sutured together. Cut ends of orbicularis oculi muscle were sutured together. Sub cuticle suture was used to close the skin incision. Nasal packing soaked in 1:100,000 adrenaline was put. Nose was packed with ribbon gauze soaked in 1:100,000 adrenaline solution.

In endonasal DCR group, nasal mucosa was infiltrated with 1:100,000 adrenaline and 2% lidocaine solution. With the help of endoscope, inspection of nasal cavity was performed and nasal mucosa was incised. Kerrison bone rongeur was used to remove the bone until lacrimal sac was exposed. Twenty three gauge light pipe used in vitreoretinal surgery was passed through one of the canaliculus into the lacrimal sac. Trans-illumination helped in the identification of lacrimal sac. Lacrimal sac was opened with the help of blade. Silicon tube was passed through upper and lower canaliculus into the nasal cavity. Two ends of the silicon tube were secured with the help of surgical

stapler. Nasal mucosa was approximated with lacrimal sac mucosa. Nasal packing with alginate foam soaked in triamcinolone was done at the end of the procedure.

All patients were prescribed topical antibiotics and steroids eye drops and decongestant nasal spray. All patients were followed up at 1 week, 1 month and 3 months.

In both groups, silicon tube was removed at 12 weeks after the surgery. Patients were followed up for 3 months. Patency of lacrimal drainage system was checked by irrigating with florescence-stained normal saline at 2 weeks, 1 month and 3 months. Functional success of the procedure was judged on the basis of relief of symptoms and anatomical success was based on patency of lacrimal passage on irrigation. Data was entered in statistical package for social sciences version 23. Chi-square test was used to compare the

success between two groups. p value equal to or less than 0.05 was considered significant.

RESULTS

In this quasi-experimental study, there were 30 patients in each group. Distribution of cases in both groups and presenting symptoms are given in Table number 1. Symptoms were present for less than 6 months in 17 (28.3%). In 12 (20%) symptoms were present for 6 to 12 months. In 19 (31.7%) cases symptoms were present for one year to two years. In 12 (20%) cases symptoms were present for more than 2 years. Anatomical and functional success in both groups is given in Table number 2. There was no statistically significant difference in anatomical and functional success between the two groups.

Table 1: Demographic Characteristics of Patients and Presenting Symptoms in two groups.

Group	Male	Female	Age	Epiphora	Regurgitation	Dacryocystitis	Conjunctivitis
Endonasal	7 (23.3%)	23 (76.67%)	42.40 ± 12.67	30 (100%)	24 (80%)	11 (36.67%)	14 (46.67%)
External	9 (30%)	21 (70%)	41 ± 11.67	30 (100%)	21 (70%)	14 (46.67%)	18 (60%)

Table 2: Anatomical and Functional Success.

Group	Anatomical Success	Chi-Square/ p-value	Functional Success	Chi-Square/ p-value
Endonasal	25(83.33%)	0.577/0.35	23(76.67%)	0.089/0.50
External	27(90%)		22(73.33%)	

DISCUSSION

External DCR has been considered as the gold standard for the treatment of nasolacrimal drainage system blockage beyond common canaliculus. Recent advances in endoscopic visualization system, surgical instrumentation and growing expertise of surgeons have paved the way to the minimal invasive surgical approach. As a result, Endonasal DCR is gaining popularity.⁸ Likewise, in our institution there is a growing trend in transition to the minimally invasive surgical approach whereby more and more patients are being offered endonasal DCR.

DCR is all about creating a fistula between lacrimal sac and nasal cavity. Making window in the bony wall of nose is essential part of this procedure. The most common cause of failure of DCR surgery is closure of the bony ostium into the bony wall of the nose. Intraoperative tissue damage leading to

postoperative scarring is one the main contributing factors in the closure of the opening of bony ostium.⁹ Interestingly initial size of the bony ostium is not related to the postoperative final size of bony opening.¹⁰ More emphasis is given on minimizing surgical trauma to prevent postoperative scarring of the ostium. Better visualization with the help of endoscopes and minimal tissue dissection with fine surgical instrumentation is the key concept behind minimally invasive surgical techniques.¹¹ Approximation of lacrimal sac and nasal mucosa appears to offer the best result in maintaining the patency of bony opening in DCR surgery.^{12,13}

In the present study, meticulous care was taken to approximate the flaps of lacrimal sac and nasal mucosa. At the same time unnecessary dissection and cautery was avoided in both groups to minimize postoperative scarring. Anatomical success rate for endonasal DCR was 25 (83.33%) and for external DCR was 27 (90%). Functional success rate for endonasal DCR was 23 (76.67%) and for external DCR was 22 (73.33%).

The success rate of endonasal DCR in the current study is comparable to the results of Herzallah et al. where success rate was 87.88%.⁸ In a study done by

Hartikainen and colleagues external DCR was successful in 91% cases while endonasal DCR was successful in 63% cases.¹⁴ In another study done by the same author endonasal endoscopic DCR success rate was 75% and external DCR success rate was 91% at the end of one year.¹⁵ Javate and coauthors performed a longitudinal study comparing the success rate of endonasal DCR with that of external DCR. Success rate of endonasal DCR was 90% as compared to 94% for external DCR.¹⁶ Study done by Hii et al. showed success rate of 92.1% for endonasal DCR and 91.7% for external DCR.¹⁷ In a study done by Walker and colleagues endonasal DCR success rate was 90.2% and external DCR success rate was 89.8%.¹⁸ Su and colleagues compared the anatomical and functional success rate between endonasal and external DCR. In their study no significant difference was noted in the success between the two groups. Anatomical success for endonasal and external DCR was 93.5% and 95.8% respectively. Functional success for endonasal and external DCR was 90.7% and 90.1% respectively.¹⁹ Ben and colleagues study demonstrated a significantly higher success rate of endonasal DCR (84%) as compared to external DCR (70%).²⁰ In another study conducted by Karim and coauthors success rate of endonasal and external DCR was 82.4% and 81.6% respectively.²¹ Jain et al study showed equal success rate of 87% in endonasal versus external DCR.²² Success rate of external and endonasal DCR was 90.9% and 91.3% in study of Gupta.²³ It was 94% and 86% in a study of Leong.²⁴ Results of all studies show equal and reasonably higher success rate of endonasal and external DCR. Results of our study are comparable to all those results.

Endonasal DCR with less manipulation of tissue and less extensive dissection theoretically promotes healing with primary intension. This leads to less formation of granulation tissue and subsequent scarring and stenosis of internal ostium.²⁵

Limitation of the current study was small sample size, shorter follow up and being conducted in a single center. In future large scale multi-center study with long term follow up is required to conclude the outcome of Endo nasal DCR.

CONCLUSION

Endonasal DCR offers minimal invasive approach with comparable anatomical and functional results to the external DCR.

Ethical Approval

The study was approved by the Institutional review board/Ethical review board.

(Ref No. 51/DME/SLMC/SWL)

Conflict of Interest

Authors declared no conflict of interest.

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Authors' Designation and Contribution

Muhammad Tariq; Professor: *Concepts, Design, Manuscript preparation.*

Ahmad Zeeshan Jamil; Associate Professor: *Literature search, Drafting of article, Critical revision.*

Shahid Ali; Assistant Professor: *Manuscript writing, Critical revision.*

Muhammad Khalid; Professor: *Literature search, Statistical analysis.*

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