Clinical Profile and Surgical Outcomes of External Dacryocystorhinostomy in a Public Tertiary Training Hospital in the Philippines

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ABSTRACT

Background. External dacryocystorhinostomy (DCR) is the most commonly performed major procedure for relieving primary acquired nasolacrimal duct obstruction. Local data on the clinical profile of these patients, surgical success rate, and complications encountered are lacking; hence the need for baseline institutional data.

Objective. The primary objectives were to determine the surgical success rate of external dacryocystorhinostomy (DCR) for primary acquired nasolacrimal duct obstruction in a public tertiary training hospital and describe their clinical profile. The secondary objectives were to identify the most common postoperative complications and patient or surgeon factors that may affect outcomes of surgery.

Methods. A single-center retrospective cohort study including 331 cases of primary external dacryocystorhinostomy was done from January 2011 to June 2019. Patient charts were reviewed for age, sex, history of dacryocystitis, duration of tearing, comorbidities, surgeon level of training, and duration of silicone tube intubation. Functional outcome in terms of presence of epiphora postoperatively and anatomical outcome, which depended on lacrimal apparatus irrigation or dye disappearance test done postoperatively, were included in the review of patient charts. Statistical analysis was done using the Mann-Whitney U test, chi-square test, and univariable and multivariable binary logistic regression analysis.

Results. The functional and anatomic success rates of primary external DCR at 3 months postoperative were 95.77% and 97.58%, respectively, and 93.05% functionally and 91.90% anatomically at six months. The median age for the patients was 59 years old, and predominantly female. There was insufficient evidence to conclude any significant differences in the following characteristics between those who had functional success and those who had functional failure, such as age, history of dacryocystitis, duration of tearing, presence of comorbidities such as hypertension, diabetes mellitus, tuberculosis, hyperthyroidism, bronchial asthma and allergies, the level of training of the surgeon, and the laterality of the procedure. Our data showed a higher rate of functional failure among males and those who had shorter silicone tube intubation times.

Conclusion. Primary external DCR in our setting achieved excellent surgical success rates and low complication rates. Surgical failure remained its most common complication, and apart from it, the other common complications were minor and were conservatively managed. The length of silicone tube intubation time may have contributed to surgical success, which warrants prospective confirmation.

Keywords: external dacryocystorhinostomy, clinical profile, surgical outcomes, complications

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INTRODUCTION

External Dacryocystorhinostomy (DCR) is a procedure that aims to eliminate fluid and mucus retention within the lacrimal sac by bypassing the obstructed nasolacrimal duct. There are two main types of dacryocystorhinostomy, classified according to the surgical approach: endonasal or endoscopic, and external. It is a common and simple surgical procedure among ophthalmologists. First described in 1904, external DCR remains the surgical procedure of choice for most oculoplastic surgeons to relieve nasolacrimal duct obstruction owing to its higher success rate, wider and clearer surgical field, and more precise intraoperative assessment of the obstructed area.1

In the Philippine General Hospital (PGH), a tertiary hospital and a training facility for ophthalmologists, external DCR is an expected competency of residents in training. It is the most commonly performed major surgery of the Oculoplastics Service. In 2018, sixty cases of external DCRs were performed in our operating room complex.[2]

As a public end-referral institution, the hospital receives some of the more complicated cases of nasolacrimal duct obstruction (NLDO). However, patients undergoing clearance for cataract surgery and patients with complaints of tearing also undergo screening for NLDO at the general clinic; the majority of the cases being done are still relatively simple.

Despite being a common procedure, our institution has minimal statistics regarding external DCR, such as the patient profile, its surgical outcomes, complication rates, or patient satisfaction. With these data, we can assess if we are at par with international institutions in terms of outcomes of the surgery. By analyzing our patient demographics, we can make conclusions about factors that may predispose our patients to anatomic or functional failure, if any. By studying outcomes, our common surgical complications can be identified and possibly addressed, and patients can be advised accordingly. Lastly, with the advent of newer surgical variations and techniques, we can use this data as the baseline in comparing outcomes.

OBJECTIVES

The primary objectives of this study were to determine the surgical success rate of external dacryocystorhinostomy for primary acquired nasolacrimal duct obstruction in our institution and describe their clinical profile. The secondary objectives were to identify the commonly encountered post-operative complications as well as any patient and surgeon factors associated with the outcomes of surgery.

METHODS

This was a single-center retrospective cohort study conducted at the Oculoplastics service of the Department of Ophthalmology and Visual Sciences of the PGH. Records of patients diagnosed with primary acquired nasolacrimal duct obstruction and who eventually underwent external dacryocystorhinostomy, performed by service consultants, fellows, or residents from January 2011 to June 2019, were obtained.

All adult patients diagnosed with primary acquired NLDO who underwent external DCR during the study period and were able to follow up within three months postoperatively were eligible for inclusion. Exclusion criteria included patients who were unable to follow up for three months, who presented with acute dacryocystitis, pediatric age, and those with congenital or secondary causes such as neoplastic, traumatic, or mechanical processes.

Medical records of these identified cases were reviewed. The following patient details were noted: age, sex, any history of dacryocystitis, duration of tearing, comorbidities, date of surgery, laterality of surgery, level of training of the surgeon, and duration of silicone tube intubation. All eligible cases within the study period were included; hence, total enumeration was done rather than sampling of the population.

Postoperatively, symptoms of bothersome tearing were noted at 1 day, 1 week, 1 month, and 3 months after the procedure. Functional outcomes were assessed from postoperative symptoms and could be evaluated at each visit, so functional success or failure was determined at 3 months. Anatomic patency was assessed by lacrimal irrigation, which was not routinely performed while the silicone tube was still in place. As tubes were typically removed at 6 months in our practice, anatomic outcomes could only be evaluated at or after extubation (earlier only if the tube was removed early). Anatomic failure was therefore assessed at 6 months. Patients with 3 to under 6 months of follow-up were deliberately retained so that the intubation period could be assessed as a possible factor affecting functional outcomes. Outcomes were evaluated at 3 and 6 months, but any failures presenting later were also recorded. Lacrimal irrigation apparatus testing or probing, if done at each follow-up visit, was also noted in the results. Presence of postoperative complications and the duration of intubation were recorded.

Categorical variables were described as count and proportion. These different characteristics were compared between the two groups: functional success and functional failure. Significant differences in the median/mean-rank of the different numerical variables between the two groups were determined by the Mann-Whitney U test. Heterogeneity of the proportions of the different categorical variables between the two groups was determined by the chi-square

[1] *Barmettler A, Ehrlich JR, Lelli G Jr. Current preferences and reported success rates in dacryocystorhinostomy amongst ASOPRS members. Orbit 2013; 32(1): 20–26.*

[2] *Philippine General Hospital Sentro Oftalmologico Jose Rizal (2018) Accomplishment Report 2018. Retrieved from department archives.*

test or Fisher's exact test. The associations between functional failure and the different clinical factors were determined by univariable and multivariable binary logistic regression analysis. A cutoff of p-value <0.05 identifies a significant factor associated with functional failure following external dacryocystorhinostomy.

RESULTS

Patient Demographics

Three hundred and thirty-one (331) cases met the inclusion criteria. The median age was 59 years, and 297 patients (89.73%) were female. A history of dacryocystitis was present in 128 patients (38.67%), and the median duration of tearing before surgery was 24 months. Hypertension was the most frequent comorbidity (124 patients, 37.46%). Most procedures were performed by residents (188, 56.80%), followed by fellows (127, 38.37%) and consultants (16, 4.83%). Laterality was evenly distributed. The median duration of silicone tube intubation was 5 months. Patient characteristics are summarized in Table 1.

There is a significantly higher proportion of females with functionally successful surgery, compared to their male counterparts. Those who underwent functionally successful surgeries were found to have significantly longer intubation periods (median of 5 months) compared to those who had functionally failed (median of 3 months, p-value = 0.009). There is no sufficient evidence to conclude that there are significant differences in the following characteristics between those who had functional success from those who had functional failure: age, history of dacryocystitis, duration of tearing, presence of comorbidities such as hypertension, diabetes mellitus, tuberculosis, hyperthyroidism, bronchial asthma and allergies, the level of training of the surgeon, and the laterality of the procedure (Table 2).

Table 1. Characteristics of patients who underwent external DCR from 2011 to 2019

Characteristics	Full cohort, n = 331
Age, years, median (IQR)	59 (20)
Sex, n (%)	
Male	34 (10.27%)
Female	297 (89.73%)
History of dacryocystitis, n (%)	128 (38.67%)
Duration of tearing, months, median (IQR)	24 (48)
Hypertension, n (%)	124 (37.46%)
Diabetes mellitus, n (%)	39 (11.78%)
Tuberculosis, n (%)	10 (3.02%)
Hyperthyroidism, n (%)	8 (2.42%)
Bronchial asthma/ allergy, n (%)	12 (3.63%)
Surgeon, n (%)	
Resident	188 (56.8%)
Fellow	127 (38.37%)
Consultant	16 (4.83%)
Laterality, n (%)	
Left	165 (49.85%)
Right	166 (50.15%)
Intubation period, months, median (IQR)	5 (3)

Surgical Outcomes

After holding all the other variables constant, only the patient sex and intubation period were found to be significantly associated with functional failure by 6 months post-external DCR. Females were found to have a 72% decrease in the odds of functional failure compared to males. For every 1 month increase in intubation period, the odds of functional failure decrease by 25%. Regression analysis showed that there is insufficient evidence to conclude that any of the following factors are associated with functional failure 6 months postoperatively: age, history of dacryocystitis, duration of tearing, history of hypertension, diabetes, pulmonary tuberculosis, hyperthyroidism, bronchial asthma and allergies, the surgeon's level of training, and the laterality of the procedure (Table 3).

Common Complications

Of 331 subjects who satisfied the inclusion criteria, a total of 29 experienced functional failure, 23 of those within the first 6 months postoperatively. Functional failures presented as early as 1.5 months after surgery to as late as 2 years postoperatively. Surgical failure was the most common complication of the procedure.

Other most common complications, in decreasing frequency, are periorbital hematoma (n=9, 2.71%), hypertrophic scarring (n=7, 2.11%), acute dacryocystitis (n=7, 2.11%), epistaxis within the first week (n=2, 0.6%), and wound dehiscence (n=1, 0.3%). All cases of periorbital hematoma were managed conservatively by giving cold or warm compresses. With the exception of one case, all cases of hypertrophic scarring or keloid formation received triamcinolone injection (10mg/ml) in the scar site, which led to the resolution of the lesion. There was one patient who opted to observe the keloid scar.

Acute dacryocystitis occurred in 7 patients, even while the silicone tube was in place. Two patients experienced dacryocystitis 1 month postoperatively, while the other 5 exhibited signs at 3 months postoperatively. Five of the seven who had postoperative acute dacryocystitis eventually showed anatomic failure.

DISCUSSION

The functional and anatomic success rate of external DCR in our institution at 3 months postoperative is 95.77% and 97.58%, respectively, and 93.05% functionally and 91.90% anatomically at six months. These rates are close to or better than the average cited in previous studies. In most cases, the anatomic success rate is usually higher than the functional

Table 2. Comparison of the functional success and functional failure groups based on their baseline characteristics, clinical profile and surgical factors

Characteristics	Full cohort, n = 331	Functional success, n = 308	Functional failure, n = 23	*p*-value
Age, years, median (IQR)	59 (20)	59 (19)	64 (19)	0.170
Sex, n (%)				0.021
Male	34 (10.27%)	28 (9.09%)	6 (26.09%)	
Female	297 (89.73%)	280 (90.91%)	17 (73.91%)	
History of dacryocystitis, n (%)	128 (38.67%)	119 (38.64%)	9 (39.13%)	0.963
Duration of tearing, months, median (IQR)	24 (48)	24 (48)	24 (36)	0.970
Hypertension, n (%)	124 (37.46%)	115 (37.34%)	9 (39.13%)	0.864
Diabetes mellitus, n (%)	39 (11.78%)	37 (12.01%)	2 (8.70%)	1.000
Tuberculosis, n (%)	10 (3.02%)	10 (3.25%)	-	1.000
Hyperthyroidism, n (%)	8 (2.42%)	7 (2.27%)	1 (4.35%)	0.442
Bronchial asthma/ allergy, n (%)	12 (3.63%)	12 (3.90%)	-	1.000
Surgeon, n (%)				0.486
Resident	188 (56.8%)	176 (57.14%)	12 (52.17%)	
Fellow	127 (38.37%)	118 (38.31%)	9 (39.13%)	
Consultant	16 (4.83%)	14 (4.55%)	2 (8.70%)	
Laterality, n (%)				0.841
Left	165 (49.85%)	154 (50.00%)	11 (47.83%)	
Right	166 (50.15%)	154 (50.00%)	12 (52.17%)	
Intubation period, months, median (IQR)	5 (3)	5 (3)	3 (2)	0.009

Table 3. Factors associated with functional failure within 6 months from external dacryocystorhinostomy

Characteristics	Univariable			Multivariable		
	OR	95% CI	*p*-value	OR	95% CI	*p*-value
Age	1.020	0.99, 1.06	0.136	1.030	0.99, 1.08	0.099
Female sex	0.280	0.10, 0.78	0.014	0.260	0.09, 0.76	0.014
History of dacryocystitis	1.020	0.43, 2.43	0.963	1.360	0.48, 3.85	0.567
Duration of tearing	0.990	0.98, 1.00	0.244	0.990	0.98, 1.00	0.140
Hypertension	1.080	0.45, 2.57	0.864	0.940	0.35, 2.52	0.901
Diabetes mellitus	0.800	0.16, 3.10	0.636	0.670	0.13, 3.38	0.624
Hyperthyroidism	1.950	0.23, 16.60	0.539	3.750	0.34, 41.08	0.280
Surgeon						
Resident	Reference			Reference		
Fellow	1.120	0.46, 2.74	0.806	1.140	0.44, 2.93	0.789
Consultant	2.100	0.43, 10.30	0.363	3.190	0.57, 18.00	0.188
Right eye	1.090	0.47, 2.55	0.841	1.260	0.51, 3.14	0.612
Intubation period	0.750	0.60, 0.95	0.015	0.760	0.60, 0.96	0.021

success rate. In our case, the denominators used to compute the anatomic and functional success rates are different because 84 of the 331 study patients did not have postoperative lacrimal apparatus irrigation or dye disappearance test done at any of the postoperative visits. Subjective complaints of tearing, however, were always noted on follow-up.

Similar studies have been conducted in different institutions worldwide, with similar methodologies and data sets. A few studies went on to grade symptoms using the Scoring System for tearing,[3] Walland et al. identified two predictive factors for surgical failure: postoperative soft tissue infection and history of trauma to the lacrimal system.[4] Anatomically, Konuk et al. concluded that the most common causes of repeat DCR are an inappropriate size and location of bony ostium, fibrosis at the rhinostomy site, and canalicular obstruction.[5]

Lee et al. identified the site of obstruction as the most significant factor for functional failure.[6] Conducted over ten

years and analyzing 769 cases of external DCR, this study revealed that common canalicular obstruction and canalicular obstruction significantly increased the risk for functional failure after external dacryocystorhinostomy for primary lacrimal drainage obstruction. In subgroup analysis targeting nasolacrimal duct obstruction, a small-sized lacrimal sac was a significant risk factor for functional failure. On the other hand, another study found that patient age and sex, the surgeon's level of training (resident versus consultant), and a history of dacryocystitis did not seem to affect surgical outcomes.[7-9]

In contrast to previous studies, our data also show a higher rate of functional failure among males ($p = 0.014$) and those who had a shorter intubation time postoperatively ($p = 0.021$). The current practice in our institution is to leave the silicone tube for 6 months. There was a time, however, when the norm was 3 to 4 months. There is also a subset of patients who needed to have the silicone tubes extracted earlier in preparation for intraocular surgery. The deemed benefit or urgency of these intraocular surgeries must be weighed against the possible increased risk of surgical failure brought about by early silicone tube removal.

Among the postoperative complications, acute dacryocystitis was one that seemed to have a relationship with the surgical success rate. It is uncertain whether dacryocystitis is a risk factor for surgical failure, or a sign that the DCR had already failed. It is important to educate patients to watch out for early signs of dacryocystitis like tenderness and erythema in the postoperative site.

The strength of this study is the large study population over an eight-year period in a single institution. The weaknesses of the study are the inherent selection bias from total sampling in retrospective data collection, such as damaged charts with missing pages, and inconsistent use of LAI and DDT postoperatively. Excluded records were not tabulated by specific reason, as screening stopped once ineligibility was established; the exact number and category-level breakdown of exclusions are therefore not available. In addition, because anatomic assessment depended on tube removal and irrigation/probing, anatomic outcome data were available for fewer patients than functional outcome data. There was also no uniformity in the surgical technique because the surgeries were performed by different surgeons in varying levels of training. The multivariable model adjusts for the measured potential confounders. Follow-up duration per patient was also not captured during data collection, so mean and total follow-up time could not be reported.

Current evidence suggests that silicone tube intubation does not affect the success rate of the surgery, but the results of this study show a higher success rate at 6 months for cases with longer silicone tube intubation periods. Future similar studies should record each patient's follow-up duration to allow reporting of mean follow-up and time to failure.

CONCLUSION

Primary external DCR performed in a public tertiary training hospital achieved anatomic and functional success rates at 3 months and 6 months postoperatively, which are within the average range of other studies. Surgical failure remained the most common complication of external dacryocystorhinostomy. Apart from anatomic failure, the other common complications were conservatively managed. The length of silicone tube intubation time may contribute to functional success associated with lower odds of functional failure.

Despite newer and less invasive techniques, this study further validates the long-standing popularity of external DCR among ophthalmologists. Even in a public training hospital cohort with different surgeon levels of training and various patient factors, the surgery has a high success rate and low complication rates. Outcomes of newer DCR techniques must be assessed relative to these figures.

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Statement of Authorship

Both authors certified fulfillment of ICMJE authorship criteria.

Author Disclosure

Both authors declared no conflicts of interest.

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