A Comparative Study of Dacryocystorhinostomy with or without Stent in a Tertiary Teaching Hospital of Telangana

Imtiaz Ahmed Khan¹, Naseeruddin Mujahid², Nabeel³

¹, ², ³ Department of ENT, Deccan College of Medical Sciences, Hyderabad, Telangana, India.

ABSTRACT

BACKGROUND
Epiphora is a common annoying symptom, embarrassing the patient both socially and functionally and may even endanger the eye. Chronic Dacryocystitis is the most common cause of epiphora which arises from nasolacrimal duct occlusion. Dacryocystorhinostomy (DCR) is the procedure of choice in the management of Dacryocystitis. We wanted to study the final outcome following endonasal DCR for chronic dacryocystitis with or without using silicon stent, evaluate the causes of persistence of epiphora in patients with or without the use of lacrimal stents and identify the methods of overcoming them postoperatively.

METHODS
A case control study to compare the results of Endonasal DCR with and without stent was conducted among 96 patients of both genders aged above 20 years with symptoms and signs suggestive of nasolacrimal duct blockage. All the cases and controls were randomly selected and included as group A and group B.

RESULTS
96 patients were included in this study and they were divided into two groups (Group A and Group B) with 48 patients in each group. More than 75 % of the patients were between 31 and 60 years of age with a mean age of 44.36 ± 3.15 years. In Group B, 72.91 % of the cases were between 31 and 60 years of age with a mean age of 45.50 ± 4.10 years. There was no statistically significant difference in both groups. In group A (DCR with stent) success rate or relief of symptoms was 96 % whereas in group B (DCR without stent) success rate or symptomatic relief was 80 %.

CONCLUSIONS
Endoscopic endonasal DCR with stent is a safe and minimally invasive procedure and is an effective treatment for patients who have failed primary endoscopic DCR without stent and also in cases of mucocele and pyocele of the sac.

KEYWORDS
Chronic Dacryocystitis, Dacryocysto-Rhinostomy, Nasolacrimal Duct and Endoscopic Dacryocysto-Rhinostomy

Corresponding Author:
Dr. Imtiaz Ahmed Khan,
Associate Professor,
Department of ENT,
Princess Esra Hospital (PEH),
Hyderabad, Telangana, India.
E-mail: iak.knl99@gmail.com
DOI: 10.18410/jebmh/2021/290

How to Cite This Article:
Khan IA, Mujahid N, Nabeel. A comparative study of Dacryocystorhinostomy with or without stent in a tertiary teaching hospital of Telangana. J Evid Based Med Healthc 2021;8(20):1532-1537. DOI: 10.18410/jebmh/2021/290

Submission 20-10-2020,
Peer Review 28-10-2020,
Acceptance 26-03-2021,
Published 17-05-2021.

Copyright © 2021 Imtiaz Ahmed Khan et al. This is an open access article distributed under Creative Commons Attribution License [Attribution 4.0 International (CC BY 4.0)]
BACKGROUND

Epiphora is a common annoying symptom, embarrassing the patient both socially and functionally and may even endanger the eye. Inflammation of the lacrimal sac is known as Dacryocystitis.\textsuperscript{1} It is the most common cause of Epiphora (87 %) according to Jacob Basil.\textsuperscript{1} Chronic Dacryocystitis (CDC) is the common form of Dacryocystitis which arises from nasolacrimal duct occlusion.\textsuperscript{2} The procedure of choice in the management of chronic Dacryocystitis is Dacryocystorhinostomy (DCR).\textsuperscript{3} The function of Dacryocysto-rhinostomy is to divert lacrimal drainage into the nose through an osteotomy at the level of the lacrimal bone.\textsuperscript{4} This procedure is preferred either through an external / endonasal approach.\textsuperscript{5}

The Watering Eye - Applied Anatomy

The lacrimal drainage system consists of the puncta, ampullae, canaliculi, lacrimal sac and nasolacrimal duct.\textsuperscript{6} The watering due to obstructive epiphora is usually unilateral and not associated with ocular irritation. Since the description of the external DCR in 1904 and the endoscopic DCR in 1910, the DCR has progressed from an exclusively ophthalmologist's surgery to one being performed by a large number of practicing otolaryngologists today.\textsuperscript{7} By understanding the factors which lead to the failure of endoscopic DCR, it results in the enhancement of success of endoscopic DCR.\textsuperscript{8}

Objectives

- The present study evaluates comparative study between DCR with stent insertion and DCR without stent insertion and studies the surgical outcomes of endoscopic endonasal DCR technique with and without the use of silicon stent intraoperatively.
- To enumerate the causes of persistence of epiphora in patients with or without the use of lacrimal stents and identify the methods of overcoming them postoperatively.

METHODS

The study period was from January 2018 to June 2019. This was a case control study to compare the results of Endonasal DCR with stent and without stent. It was done in the Department of otorhinolaryngology, Owaisi Hospital and Research Centre and princess ESRA Hospital, Deccan college of medical sciences, Hyderabad, India

It consisted of 96 patients of both genders aged above 20 years of age with symptoms and signs suggesting of nasolacrimal duct blockage. All the cases and controls were randomly selected using random. Org software to include in the study and to divide the subjects into group A (Stent used) and group B (Stent not used), with matching age, gender, symptoms, and signs of Nasolacrimal duct blockage.

Sample size
Sample size was calculated using 95 % confidence interval, error margin of 10 % and 1 lakh population using the formula

\[ n = \frac{Z_{a/2}^2 \times p \times (1-p)}{\left( p - 1 - p \right)^2} \]

Based on the above formula sample size calculated as N= 96. As mentioned, it was a hospital-based study in ENT department and considering patient availability and resources we decided 50 as sample size and divided them into 2 equal groups of 48 each to make it a comparable.

Inclusion Criteria
1. Patients diagnosed as Chronic Dacryocystitis, both new and revision surgery patients were included. 2. Patients of both genders were included. 3. Patients aged above 20 years and below 70 years were included.

Exclusion Criteria
1. Patients with infraorbital diseases were excluded. 2. Patients with associated Sino nasal diseases were excluded. 3. Patients with lower canaliculi blockage, failed surgical cases of external DCR and endonasal DCR were excluded. 4. Patients with Chronic Dacryocystitis associated with fistulas, sinus diseases, Chronic Dacryocystitis of more than 10 years were excluded. The age and sex of the patients recorded. All patients were submitted to ENT clinical examination and Diagnostic nasal endoscopy (DNE) to identify any nasal pathology. CT scan of nose and Para nasal Sinuses were done in patients with gross septal deviations. Following clinical examination, lacrimal syringing to demonstrate the presence of block and site of block in the lacrimal drainage system was undertaken. Haematological investigations such as haemoglobin, TC, DC, bleeding time and clotting time and platelet counts were done. Among the 96 patients 48 patients each were included in group A and group B. Detailed counselling with patients was undertaken prior to allotment of the patients to the individual groups.

Consent
The surgical procedure and usage of stent was explained to the patients verbally as well as by using a written pamphlet. All the patients were operated under Local General Anaesthesia. All the patients were followed up for a period of 6 months with a keen observation for development of complications and recurrences and extrusion of the stent. A flow chart was used to identify the site of obstruction in lacrimal apparatus enabling to include in the study (Fig 1).
This helps to differentiate between canalicular, common canalicular and nasolacrimal nasal obstruction-
(A) If an obstruction is encountered, the probe is grasped with forceps at its entrance to the punctum & is then withdrawn. The distance from the forceps to the probe gives the location of the canalicular obstruction.
(B) Obstruction of the common canaliculus is encountered as a soft stop to passage of the probe. Medial canthal tissue drags with advancement of the probe. This confirms common canaliculus or internal common punctual obstruction.
(C) Passage of the probe into lacrimal sac terminates with a hard stop when the probe encounters the medial wall of the sac in the lacrimal fossa.

Nasal Examination
Intranasal exam, diagnostic nasal endoscopy (DNE), is necessary in the patient in whom obstruction in sac or nasolacrimal duct (NLD) is demonstrated. DNS towards the obstructed side, enlarged middle turbinate bone, polyps, neoplasms, intranasal infections and sinusitis can cause epiphora or occlusion of the exit of NLD into the nasal cavity.

Operative Procedure
Endonasal DCR procedure used was a simple and well tolerated technique. The patient was given preanaesthetic medication overnight and mild sedation was given with Tab Alprazolam 0.25 mg before going to bed. In the morning he was administered Inj. Atropine and nasal moffeting was done with 4 % Lidocaine with 1: 100,000 Epinephrine, half an hour before shifting him to the operation theatre. An initial endoscopic examination of the nasal cavity was done using 4 mm zero degree and 45 - degree sinus endoscopes. Gross deviation of the nasal septum was looked for and when present either spurectomy or Septoplasty was done to create space for DCR procedure. Nasal mucosa was infiltrated with 1 % Lidocaine with 1: 100,000 epinephrine, anterior to the middle turbinate and over the axilla of middle turbinate. Septoplasty had to be undertaken in 10 (10.41 %) of the patients. Mucosal incision was made over the lateral wall of the nasal cavity using 15 number scalpel blade. First horizontal incision was 8 to 10 mm above the lower border of middle concha, 3 mm posterior to its insertion on the lateral wall of the nasal cavity. A mucosal flap was raised by continuing the horizontal incision vertically upwards for 6 mm. A mucosal flap was raised and reflected forwards exposing the lacrimal bone, nasal process of the maxilla. The unciated process would be seen and taken as a guide not to venture posteriorly.

Finally, a new horizontal incision, from the uncinate process towards anteriorly for 8 to 10 mm. Following that a mucosal flap, was elevated keeping the dissection always close to the bone. The thinner lower part of the lacrimal bone was separated from the uncinate process by using some sphenoid bone punch forceps. The lacrimal bone was removed in its entirety including the thicker upper part. A Kerrison’s punch forceps was used to make the osteotomy wider at the expense of its anterior wall including the frontal process of maxilla. Now the bone was removed as much as possible throughout the entire lacrimal fossa was exposed. Now pressure was applied over the sac externally over the medial canthus of the eye to produce a bulge of lacrimal sac and confirmation. The medial wall of the lacrimal sac was infiltrated with 1 % Lidocaine solution to avoid pain during its incision. The sac was incised longitudinally in its entire extension to make an opening. The lateral wall was made
into two flaps. The anterior flap was fashioned larger than the posterior flap as the anterior flap was used to turn over the remaining bone of the frontal process of the maxilla. This was possible as the longitudinal incision of the lacrimal sac was little more posterior in relation to the midline. The posterior flap remained in direct contact with the initially made mucosal flap. The mucosal flap was partially resected till it was at even level to the posterior flap of the lacrimal sac. Whereas the upper part of the mucosal flap was re-positioned over the middle turbinate so that it covered any naked part of the bone left over at this junction. In group A 48 patients underwent stent procedure wherein 8 mm of silicon tubes introduced from superior and inferior lacrimal canaliculi into the nose via the opening created in the lacrimal sac. The rigid ends protruding into the nasal cavity are then grasped and then cut, and the silastic ends are trimmed and tied, 25 cases were done with stents. The knots should not be under tension to avoid possible injury to the canaliculi. (Nasal Packing was not necessary as it may cause disruption of flaps which were re positioned previously). Post op care is essentially the same used in any other endoscopic Sinonasal surgery. Nasal douching with saline solution is important. Regular follow up of patients was done at 1st week, 1st month, 3rd month & 6th month. At the end of the 6 months’ patients were assessed subjectively and objectively.

Statistical Analysis
The data collected was analysed using the mean, standard deviation, and percentages. Student T test was used to compare the variables between the two genders and two groups in the study. Odds ratio calculator (with Yate's correction) was used to correlate the final outcome of the surgical procedures adopted in the two groups.

RESULTS

This was a Prospective study to evaluate the different causes of recurrence of epiphora in a case of Endonasal DCR operation. 96 patients were included in this study and they were divided into two groups (Group A and Group B) with 48 patients in each group. In Group A more than 75 % of the patients belonged to the age groups between 31 and 60 years with a mean age of 44.36 ± 3.15 years. In Group B 72.91 % of the patient’s cases were in the age group between 31 and 60 years with a mean age of 45.50 ± 4.10 years. There was no significant statistical difference between the two groups (Table 1). (P value was more than 0.05).

| Age Groups | Group A - 48 | Group B - 48 |
|------------|-------------|-------------|
| Number     | Percentage  | Number      | Percentage  |
| 20 - 30    | 05          | 10.41 %     | 06          | 12.5 %     |
| 31 - 40    | 11          | 22.91 %     | 10          | 20.83 %    |
| 41 - 50    | 14          | 29.16 %     | 12          | 25.00 %    |
| 51 - 60    | 12          | 25.00 %     | 13          | 27.08 %    |
| 61 - 70    | 06          | 12.50 %     | 07          | 14.58 %    |

In group A 40 / 48 (83.33 %) patients were females and 08 / 48 (16.66 %) were males. In group B 38 / 48 (79.16 %) were females and 10 (20.83 %) were males. There was no statistically significant difference between the two groups as far as gender was concerned (Table 2). (P value was more than 0.05)

| Gender | Group A - 48 | Group B - 48 |
|--------|-------------|-------------|
| Number | Percentage  | Number      | Percentage  |
| Females | 40          | 63.33 %     | 38          | 79.16 %    |
| Males   | 08          | 16.66 %     | 10          | 20.83 %    |

Table 2. Sex Distribution of Cases in Groups A & B (N = 48 in Each Group)

Post OP Period or Follow Up
Subjective Assessment
During the 1st week, all 48 patients (100 %) reported relief of symptoms in both group A and B. After the 1st month 48 (100 %) of the group A patients and 40 / 48 (83.33 %) of the group B patients expressed complete relief of symptoms. However, 08 / 48 (16.66 %) of the group B patients expressed return of symptoms in group B. After 6 months 46 / 48 (95.83 %) patients of group A reported relief of symptoms and 02 (04.16 %) patients had reported no relief of symptoms. In group B 38 (79.16 %) patients reported relief of symptoms and 10 (20.83 %) patients had no relief of symptoms (Table 3). At the end of 6th month odds ratio was = 6.05, chi square value was 1.7045 (with Yate’s correction), P value was 0.1916. P taken as significant at < 0.01. The association between relief of symptoms and endoscopic DCR with stent at 6th month was not highly significant statistically (P > 0.01).

| Symptomatic Relief | Group A | Group B | Group A | Group B |
|--------------------|---------|---------|---------|---------|
| 1st Week           | 48      | 48      | 48      | 48      |
| 1st month          | 00      | 100     | 83.33   | 95.83   |
| 6th month          | 08      | 02      | 16.66   | 04.16   |

Table 3. Symptomatic Relief after Endonasal DCR among Group A & Group B (N = 48 in Each Group)

Objective improvement after endonasal DCR was assessed and analysed by lacrimal syringing. 1st follow up visit at the end of 1st week, all 48 (100 %) patients in group B showed patency on lacrimal syringing. Syringing was not done in group A endonasal DCR with stent due to presence of stent. At the end of 1st month in group A patients syringing showed patency in all 48 (100 %) patients. In group B patients syringing showed patency in 40 / 48 (83.33 %) patients and no patency in 08 (16.66 %) patients. This showed that the success rate in patients with endonasal DCR with stent (100 %) have a higher success rate than with endonasal DCR without stent (83.33 %). At the end of 6th month in group A patients syringing was patent in 46 (95.83 %) patients and not patent in 02 (04.16 %) patients. In group B patients syringing was patent in 38 (79.16 %) patients and not patent in 10 (20.83 %) patients (Table 4).

| Gender | Group A - 48 | Group B - 48 |
|--------|-------------|-------------|
| Number | Percentage  | Number      | Percentage  |
| Females | 38          | 79.16 %     | 36          | 75.00 %    |
| Males   | 10          | 20.83 %     | 12          | 25.00 %    |

Table 4. Age Distribution of Cases in Group A & B (N = 48 in Each Group)

J Evid Based Med Healthc, pISSN - 2349-2562, eISSN - 2349-2570 / Vol. 8 / Issue 20 / May. 17, 2021
symptoms and endoscopic DCR with stent at 6th month was not highly significant statistically (P > 0.01).

| Result of Lacrimal Syringing | 1st Week Group A | 1st Week Group B | 1st Month Group A | 1st Month Group B | 6th Month Group A | 6th Month Group B |
|-----------------------------|------------------|------------------|-------------------|-------------------|-------------------|------------------|
| Patent Number               | 0                | 48               | 48                 | 40                | 46                | 38               |
| Percentage                  | 0                | 100              | 100                | 83.33             | 95.83             | 79.16            |
| Not patent Number           | 0                | 0                | 0                  | 0                 | 0                 | 0                |
| Percentage                  | 100              | 0                | 0                  | 16.66             | 4.16              | 20.83            |

Table 4. Objective Assessment

The overall success rate of endonasal DCR with stent showed success rate of 95.83 % and the success rate of endonasal DCR without stent showed 79.16 %. The success rate of endonasal DCR combining both the methods was 84 / 96 (87.50 %) in this study (Table 5).

| Type of Surgery             | Success | Failure | Total        |
|-----------------------------|---------|---------|--------------|
| Endonasal DCR with stent    | 46 (95.83 %) | 2 (04.16 %) | 48 (100 %) |
| Endonasal DCR without stent | 38 (79.16 %) | 10 (20.83 %) | 48 (100 %) |
| Total                       | 84 (87.50 %) | 12 (12.50 %) | 96 (100 %) |

Table 5. Surgical Outcome of Endonasal DCR with and without Stent (N = 48 in Each Group)

Causes of Failure
Out of 48 cases of post endoscopic endonasal DCR with stent only 02 cases met with failure which was due to formation of granulation tissue formation. Out of 48 cases of post endoscopic endonasal DCR without stent there were a total of 10 failures. Among the 10 failed cases, 05 cases failed due to granulation tissue formation, 02 cases failed due to synechiae formation, 02 cases failed due to inadequate sac opening and 01 failed due to insufficient osteotomy (Table 6).

| Causes of Failure | Group A, Number 02 | Group B, Number 10 |
|-------------------|---------------------|---------------------|
| Granulations      | 02                  | 05                  |
| Synechiae         | 0                   | 02                  |
| Inadequate sac opening | 0        | 02                  |
| Inadequate osteotomy | 0            | 01                  |

Table 6. Causes of Failure Following Endonasal DCR (N = 48 in Each Group)

DISCUSSION

Watering of eye (epiphora) is a troublesome symptom for both patients and doctors. Even though various causes produce epiphora, Dacryocystitis is the commonest pathological cause for epiphora.8 Chronic Dacryocystitis is treated by Dacryocysto-rhinostomy.9 Chronic Dacryocystitis though a common problem of lacrimal drainage system, treated much efficiently in recent years with advances in investigative and operational technique pertaining to solve the problems associated with it, yet we face failure in some cases of endonasal DCR.11 Endoscopic DCR is a commonly performed procedure in which a fistulous tract is created between the lacrimal sac and the nasal cavity in order to relieve the epiphora due to nasolacrimal duct obstruction.12 Silicone stent has been proposed to maintain the patency of fistula during postoperative healing period.13 In consideration of the maintenance of Dacryocysto- rhinostomy site, many surgeons have thought that placing stents or tubes simultaneously during endoscopic procedure and has been performed accordingly.14 Among various stent materials such as silicone, poly methane, Prolene stents, silicon has been most commonly used due to stable non antigenic material.15

However unlike common belief that silicone tube insertion increases the post op patency rate by maintaining opening of the ostium.16 Recent studies demonstrated that silicone stent itself would be a reason for surgical failure as well as complications such as punctal erosion and splitting of canaliculi.17 The main goal of treatment in DCR is obstruction removal and establishing tear flow.18 There is a controversy in gold standard method; techniques such as probing, silicon stent and balloon dacryocystoplasty are used for obstructed lacrimal duct treatment.19 After about three decades, DCR with endonasal endoscopy has become a common choice among surgeons and stent application has been effective in this success.20 The purpose of study was to compare between endonasal DCR with stent and endonasal DCR without stent and revise the surgery to improve the drainage of lacrimal apparatus. R.A Welham21 observed the reasons for failures were usually apparent on re-operation. In our study 96 patients with chronic Dacryocystitis were chosen by taken random picking and they were analysed for the different reasons for failure of endoscopic DCR. The study also attempted to evaluate the long-term final outcome and success rate of Endonasal Endoscopic DCR done using silicon stent and not using the stent placement.

CONCLUSIONS

Endoscopic endonasal DCR with stent is a safe and minimally invasive procedure and yields good aesthetic functional results with few chances of complications. Most common causes of failure of endonasal DCR with stent are granulation tissue formation, synechiae formation, inadequate sac opening and insufficient osteotomy. In group A (DCR with stent) success rate or relief of symptoms was 96 % whereas in group B (DCR without stent) success rate or symptomatic relief was 80 %. Stent did not make much difference statistically in surgical outcomes of 2 groups. Hence stent should be used in selected indications like revision endonasal DCR. Post op care and follow up is as important as surgery and should not be avoided.

Recommendations
1. Bigger study be undertaken to evaluate the factors for failure of Endonasal DCR.
2. Factors related to wound healing need to be evaluated at molecular level.

Data sharing statement provided by the authors is available with the full text of this article at jebmh.com.

Financial or other competing interests: None.

Disclosure forms provided by the authors are available with the full text of this article at jebmh.com.
REFERENCES

[1] Jacobs HB. Symptomatic Epiphora. Br J Ophthalmology 1959;43(7):415-434.
[2] Watkins LM, Janfaza P, Rubin PAD. The evolution of endonasal dacryocystorhinostomy. Surv Ophthalmology 2003;48(1):73-84.
[3] Onceri M, Orhan M, Ogretmenoglu O, et al. Long term results and reasons for failure of intranasal endoscopic dacryocystorhinostomy. Acta Otolaryngology 2000;120(2):319-322.
[4] Vishwakarma R, Singh N, Ghosh R. A study of 272 cases of endoscopic dacryocystorhinostomy. Indian Journal of Otolaryngology and Head and Neck Surgery 2004;56(4):259-261.
[5] Al-Qahtani AS. Primary endoscopic dacryocystorhinostomy with or without silicon tubing: a prospective randomized study. AM J Rhinol Allergy 2012;26(4):332-334.
[6] Tsirbas A, Wormald PJ. Endonasal dacryocystorhinostomy with mucosal flaps. Am J Ophthalmology 1991;111:152-157.
[7] Naik SM, Mushannavar AS, Ravishankara S, et al. Endonasal dacryocystorhinostomy done with and without silicon tube stents: a comparative case series analysis study. Int J Head Neck Surg 2012;3(3):147-153.
[8] Matrimore S, Banhegyi GY, Lancaster JL, et al. Endoscopic dacryocystorhinostomy without silicone stenting. J R Coll Surg Edinb 1999;44(6):371-373.
[9] Ahmed MN, Ahmed SM, Kumar MM, et al. Clinical Evaluation of failed endonasal DCR operations and their management. Journal of Evolution of Medical and Dental Sciences 2014;3(48):11526-11532.
[10] Pittmore B, Tan N, Salis G, et al. Endoscopic transnasal dacryocystorhinostomy without stenting: results in 64 consecutive procedures. Acta Otolaryngol Ital 2010;30(6):294-298.
[11] Figueira E, Al-Abbadi Z, Malhotra R, et al. Frequency of simultaneous nasal procedures in endoscopic dacryocystorhinostomy. Ophthalmic Plastic and Reconstructive Surgery 2014;30(1):40-43.
[12] Rose GE. The lacrimal paradox: towards a greater understanding of success in lacrimal surgery. Ophthal Plast Reconstruct Surgery 2004;20(4):262-265.
[13] Shah H, Sharma S. Comparison of surgical outcome in endoscopic dacryocystorhinostomy with and without silicon stent placement. Net J Med Res 2013;3(1):34-37.
[14] Smirnov G, Tuomilheto H, Terasvirta M, et al. Silicon tubing is after endoscopic dacryocystorhinostomy: is it necessary? Am J Rhinol 2006;20(6):600-602.
[15] Thawley SE. The otolaryngologist- ophthalmologist relationship: a historic perspective. Otolaryngology Clinics of North America 2006;39(5):845-853, v.
[16] Yoo HJ, Lee H, Shin HH, et al. The effects of transcanalicular diode laser-assisted revision surgery for failed dacryocystorhinostomy. J Korean Ophthalmology Soc 2012;53(4):493-498.
[17] Singh M, Jain V, Gupta SC, et al. Intranasal endoscopic dacryocystorhinostomy in cases of dacryocystitis. Indian Journal of Otolaryngology and Head & Neck Surgery 2004;56(3):117-182.
[18] Gupta N. Improving results in endoscopic DCR. Indian J Otolaryngology Head and Neck Surgery 2011;63(1):40-44.
[19] Ali MJ, Psaltis AJ, Wormald PJ. Long-term outcomes in revision powered endoscopic dacryocystorhinostomy. Internal Forum Allergy Rhinology 2014;4(12):1016-1019.
[20] Chan WO, Selva D. Ostium shrinkage after endoscopic dacryocystorhinostomy. Ophthalmology 2013;120(8):1693-1696.
[21] Welham RA, Wulc AE. Management of unsuccessful lacrimal surgery. Br J Ophthalmology 1987;71(2):152-157.