Symptom Score Questionnaire for Nasolacrimal Duct Obstruction (NLDO) in Adults – A novel tool to assess impact on quality of life after Endoscopic Dacryocystorhinostomy

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Abstract— *Dacryocystorhinostomy (DCR) is a commonly applied surgical technique to treat nasolacrimal pathway obstruction. However, no disease-specific tools to assess the symptoms and the subjective outcome after DCR have been established. A specific Nasolacrimal Duct Obstruction Symptom Score (NLDO-SS) questionnaire was develop to evaluate the outcome and tested it in a prospective. Primary endoscopic dacryocystorhinostomy (EN-DCR) procedures were performed in 60 patients during 2013-2014. Preoperatively and during the three follow-up (3 month, 6 months and 12 months) visits, the patients were asked to fill the NLDO-SS along with Glasgow Benefit Inventory (GBI) questionnaire. The success rate of EN-DCR was 91.67%. EN-DCR resulted in a significant reduction in all of the eight symptoms scores of the NLDO-S. The GBI scores indicated a benefit at 3 months and more benefit at 6 months, but no further improvement was found between 6 and 12 months. The correlation between the total GBI and NLDO-SS was significant. EN-DCR improves the quality of life as measured by the GBI. The NLDO-SS correlated with the GBI and gave more information about the benefits after EN-DCR than GBI alone. The NLDO-SS proved to be an effective tool to evaluate lacrimal obstructions and ENDCR benefits.*

Keywords: Endoscopic Dacryocystorhinostomy, Nasolacrimal Duct Obstruction Symptom Score (NLDO-SS), Glasgow Benefit Inventory (GBI), Quality Of Life.

I. INTRODUCTION

Obstruction of the nasolacrimal pathway is a common disorder, especially in elderly patients, clinically manifested by the presence of tearing and/or infection (Woog 2007).[1] In majority of cases the cause of obstruction is idiopathic. Such becomes more common with increasing age and shows a female preponderance.[2]

The definitive treatment is the creation of a fistula from the lacrimal sac into the nose. This procedure is mainly used to treat distal outflow obstruction to the nasolacrimal system.[3] There are various methods of performing dacryocystorhinostomy for the treatment of nasolacrimal duct obstruction. Endoscopic dacryocystorhinostomy is becoming more popular, compared with conventional external dacryocystorhinostomy.[2,3] The endonasal approach to the lacrimal sac was first described by Caldwell in 1893.[4]

The symptoms of nasolacrimal duct obstruction (NLDO) were described in papyrus documents by the ancient Egyptians. (Hirschberg 1982)[5]. Tearing, blurred vision, periorbital pain, and recurrent infections in the lacrimal sac, may significantly deteriorate individuals' quality of life (Qol).

The Glasgow Benefit Inventory (GBI) has been used to evaluate patient perception of benefits from the different DCR techniques.[6] In previous studies, postoperative QoL assessments after DCR have been done using mailed questionnaires and the time of the single assessment has varied from 6 to 37 months after the procedures.[6-8] However, there are neither specific validated measures designed to assess the subjective outcome after DCR nor has the optimal time for assessment been established.

This present study was conducted with the aim to evaluate the impact of primary EN-DCR on the Qol and symptoms, and the correlations between GBI, NLDO-SS and objective findings after the surgery.

II. METHODOLOGY

This follow up study was carried out in the department of Department of Otorhinolaryngology, Jawahar Lal Nehru Medical College & Hospital, Ajmer from October 2012 to September 2014. This was a prospective study conducted on 60 patients of Chronic Dacryocystitis, who were willing for surgery. These patients were with history of persistent watering or mucoid/mucopurule discharge from eye, whom sac syringing revealed obstruction in the lower passage with regurgitation from the other punctum with mucocoele/pyocoele and external lacrimal fistula. Patients with ectropion/ entropion/ lower lid laxity, canalicular and punctal obstruction were excluded from study. Patients with sinonasal malignancy & granulomatous conditions, H/o radiation therapy and having any nasal bone deformity were also excluded from study.

Before starting the study, written informed consent was taken for voluntary participation of subjects. All cases selected for the study were evaluated using a predesigned semistructured proforma. A detailed history was taken as to age, sex, socioeconomic status, occupation, nature and duration of symptoms etc Nasolacrimal Duct Obstruction Symptom Score (NLDO-SS) questionnaire was given and symptom score will be calculated.[9]

Detailed preoperative clinical examination was done by Otorhinolaryngologist and Ophthalmologist including regurgitation testing, lacrimal syringing and probing. Examination of nasal cavity will be done with anterior rhinoscopy, posterior rhinoscopy and endoscopic evaluation in order to check for accessibility of lacrimal sac, deviated nasal septum, turbinate hypertrophy or any other associated pathology.

Radiological examination was also done like X-ray study of PNS water's view and NCCT paranasal sinuses where ever required. Routine blood investigations, urine examination, X-ray chest (PA) view, ECG will be done in all patients.

Findings of the nasal cavity were assessed and scored by using the Lund-MacKay(R)staging system. Nasolacrimal Duct Obstruction Symptom Score (NLDO-SS) questionnaire were filled at preoperatively.[9] Pre-anaesthetic check-up and xylocaine sensitivity testing of all the patients were done. The procedure was done under local or general anaesthesia. Merocel nasal pack removed on 3rd post operative day. All the patients were treated with Antibiotic eye drops. In objective assessment Endoscopic visualization of the nasal cavity performed in order to extent of mucosal edema, polyposis, crusting, secretions and scarring was assessed and scored using the Lund-MacKay endoscopic score [10] Subsequent follow up done at one week, one month, three month, six month and at twelfth month. This included symptom evaluation and scoring (i.e. checking for subjective improvement in eye watering)

and endoscopic evaluation of the newly created ostium, in order to check for adhesion formation and restenosis

Patient characteristics and variables were analyzed with the Statistical Package for Social Sciences (SPSS software version 17.0 for Windows, SPSS Inc., Chicago, IL, USA (Trial Version).

III. RESULTS

Total of 60 eligible NLDO cases were presented at the one week, 3-month and 6 months follow-up visits whereas 55 returned for 12-months followup. Additional surgery was performed in 14 (23.33%) patients due to abnormalities in the nasal cavity interfering with the operation, such as septal deviation or hypertrophic middle turbinate and nasal polyp. Uncinectomy and antrostomy was performed in four (6.67%) patients with recurrent or chronic sinusitis with nasal polyps at the same time as EN-DCR. All the patients were discharged from the hospital on the 3rd postoperative day and no intra-operative or immediate postoperative complications likely to affect the study results occurred during the study. The overall surgical success rate after primary EN-DCR at the 6-month follow-up was 91.67%. (Table 1).

Table 1
Baseline characteristics of Study Population (N=60)

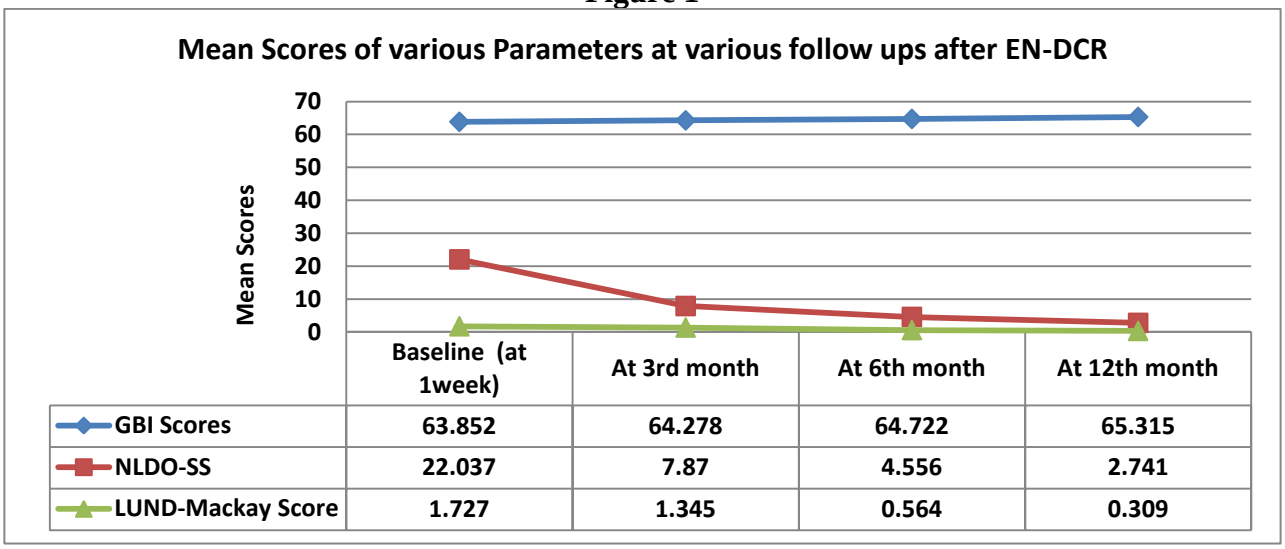
S. No.	Variables		No.	%
1	Age	<40 years	26	43.33
		>40 years	34	56.67
2	Sex	Male	11	18.33
		Female	49	81.67
3	Laterality	Unilateral	56	93.33
		Bilateral	4	6.67
4	Associated nasal pathology	Present	33	55.00
		Absent	27	45.00
5	Additional Procedure	Done	14	23.33
		Not done	46	76.67

When GBI scores were estimated at one week, 3 months, 6 months and 12 months follow ups after EN-DCR, it was found 63.85 (95% CL 61.91-65.8), 64.28 (95% CL 62.26-66.3), 64.72 (95% CL 62.77-66.68) and 65.32 (95% CL 63.17-67.46) respectively. (Figure 1)

Whereas NLDO-SS scores were found 22.04 (95% CL 19.08-24.99), 7.87 (95% CL 6.19-9.55), 4.56 (95% CL 3.47-5.64) and 2.74 (95% CL 1.75-3.73) at one week, 3 months, 6 months and 12 months follow ups respectively after EN-DCR. (Figure 1)

When LUND-Mackay Score were estimated at one week, 3 months, 6 months and 12 months follow ups after EN-DCR, it was found 1.73 (95% CL 1.40-2.05), 1.35 (95% CL 0.94-1.76), 0.564 (95% CL 0.27-0.86) and 0.309 (95% CL 0.13-0.49) respectively. (Figure 1)

Figure 1



Multivariate analysis by using repeated measure ANOVA shows that there was significant ($p<0.05$) difference in mean GBI score from Baseline to 3rd, 6th & 12th month as well as from 3rd month to 6th&12th month. But, the change in Mean GBI score from 6th month to 12th month was not Significant ($p>0.05$). (Table 2)

Table 2

Comparison among Mean GBI scores at various follow ups after EN-DCR

Comparison of GBI		Mean Difference	Std. Error	*P*-value [a]
At 1 week (Baseline)	3rd month	-.426*	.094	0.000
	6th month	-.870*	.147	0.000
	12th month	-1.463*	.371	0.001
3th month	6th month	-.444*	.156	0.037
	12th month	-1.037*	.347	0.025
6th month	12th month	-.593	.336	0.501

**** - The mean difference is significant at the .05 level*** ***a- Adjustment for multiple comparisons***

Multivariate analysis by using repeated measure ANOVA applied on NLDO-SS score were found significant ($p<0.05$) from Baseline to 3rd, 6th & 12th month as well as from 3rd month to 6th&12th month. But, the change in Mean GBI score from 6th month to 12th month was not Significant ($p>0.05$). (Table 3)

Table 3

Comparison among Mean NLDO-SS scores at various follow ups after EN-DCR

Comparison of GBI		Mean Difference	Std. Error	*P*-value [a]
At 1 week (Baseline)	3rd month	14.167*	1.061	< 0.001
	6th month	17.481*	1.256	< 0.001
	12th month	19.296*	1.363	< 0.001
3th month	6th month	3.315*	0.571	< 0.001
	12th month	5.13*	0.619	< 0.001
6th month	12th month	1.815*	0.235	<0.001

**** - The mean difference is significant at the .05 level*** ***a- Adjustment for multiple comparison***

When correlation between various type of scores was evaluated it was found -0.446 in GBI & NLDO-SS, 0.535 in NLDO-SS & LUND MACKAY and -0.436 in GBI & LUND MACKAY. All these correlations were found significant ($p<0.05$). (Table 4)

Table 4
Correlation between GBI, NLDO-SS and LUND MACKAY Scores comparison

Variables	At 3 Months		At 6 Months	
	r value	2-tailed p value	r value	2-tailed p value
GBI score <=> NLDO-SS	-0.446**	0.000	-0.709**	0.000
NLDO-SS<==>LUND MACKAY Score	0.535**	0.000	0.575**	0.000
GBI Score<==> LUND MACKAY Score	-0.436**	0.001	-0.473**	0.000

r – Pearson's correlation coefficient
**** Correlation is significant at the 0.05 level (2-tailed)***
***** Correlation is significant at the 0.01 level (2-tailed)***

Objective assessment (Lund-MacKay Endoscopic Score): As was to be expected, due to crusting and secretions related to the immediate operation we found a no statistically significant increase in 3rd month postoperative Lund-MacKay Endoscopic score compared with the preoperative score (p = 0.247). There were significant differences between the preoperative and the 6th & 12th month follow-up visit findings in the Lund-MacKay Endoscopic Score (p = 0.000).

GBI: All three follow-up questionnaires were fully completed by 55 of 60 (91.67%) of the patients. A benefit from the ENDCR was observed at all three times of assessment. There is significant difference in mean GBI score from Baseline to 3rd, 6th & 12th month as well as from 3rd month to 6th &12th month. But, the change in Mean GBI score from 6th month to 12th month is not Significant.

Nasolacrimal Duct Obstruction Symptom Score (NLDO-SS): The Significant benefit from the EN-DCR was observed at all three times of NLDO-SS assessment (3rd,6th&12th months post operative) as compared to baseline. EN-DCR resulted in a significant reduction in all of the eight items: the mean total score fell from 22.37 points (SE= 1.473) at baseline to 4.556 (SE=0.541) points (mean difference 17.481, 95% CI 14.038 to 20.925, P=0.000) at 6th months. The greatest reduction was detected in the five ocular symptoms, in which the mean score decreased from 26 points at baseline to 5 points (P = 0.000) at 6 months.

IV. DISCUSSION

Overall success rate in the present study was 91.67% at 6 months, which is similar to that reported in previous studies with primary EN-DCR.[11] Successful surgical outcome does not necessarily confer an improvement in QoL [7].Reliabe assessment tool are needed to estimate to estimate the outcome and health benefit after the intervention

There was a negative correlation between total GBI and NLDO-SS (r = -0.446, P=0.000 & r = -0.709, P=0.000 at three and six months respectively). A negative correlation was found between total GBI and Endoscopic Lund-MacKay Score at three and six months after operation (r= -0.436 , P=0.001 & r =-0.473, p=0.000) and a positive correlation between Endoscopic Lund-MacKay and NLDO-SS at three and six months postoperative visits(r=0.0.535,p=0.000;r=0.575,p=0.000 respectively).

The GBI is commonly used for the measurement of surgical benefit in rhinological procedures,[12] and it has also been used in patients with EN-DCR.[6-8] The main limitation of the GBI is that it is adapted for nasal surgery not for nasolacrimal surgery. EN-DCR operations are performed endonasally, whereas the main causes of complaints are in the ocular region. Bakri and co-authors[6] used GBI to compare and evaluate outcomes but it is not able to reflect "subtle changes in quality of life" after two different DCR techniques.

In this study GBI shows that successful EN-DCR has a significant impact on the patient QoL, improvement in health benefits was significant during the first six months follow-up period.

The incidence of nasolacrimal duct obstruction is 20/100,000 and it increases with age.[1] In the present study, the mean age of patients at the time of the surgery was 45 years. The 18-items GBI can be difficult for some of the elderly patients to complete by themselves without any guidance. Therefore, to obtain reliable information on patients' well-being, it is advisable to develop and use simplified questionnaires, such as the NLDO-SS, which was found easy to understand and, most importantly, gave information consistent with objective findings.

Postoperative care and the timing of the postoperative followup visits are important for optimal outcomes.[13] the surgical outcome of EN-DCR affected by any disturbance in the normal healing process endangers may lead to postoperative infection, granulation tissue and scar formation at the rhinostomy site.

Persistent watering after surgery was seen in 5 cases. In all of them syringing was negative. One patient with failure in group A had granulation tissue around the stent and in one patient there was closure of the rhinostomal opening, We found granulation in seven cases at the rhinostomy site, and stenosis at stoma site in 4 cases (6.67%) rhinostomal opening was seen in two cases which led to failure and in another patient there was fibrosis at the rhinostomal opening which led to failure. In this prospective study, the patients went through three follow-up visits: at one week, and at 3 and 6 months after operation. Even so, 1 patient developed obstruction between the 3 and 6 months after the EN-DCR. Thus, successful outcome at 3 months after EN-DCR did not assure success. Our results indicate that a follow-up beyond months after EN-DCR may detect some late complications.

V. CONCLUSION

This present study indicates that the NLDO-SS questionnaire provides more information for subjective postoperative outcome assessment after EN-DCR, thus it is novel tool. Furthermore, for better assessment it requires studies on more number of patients and for longer postoperative follow-ups.

CONFLICT OF INTEREST

None declared till now.

REFERENCES

[1] Woog JJ. The incidence of symptomatic acquired lacrimal outflow obstruction among residents of Olmsted County, Minnesota, 1976-2000 (an American Ophthalmological Society thesis). Trans Am Ophthalmol Soc 2007; 105: 649-66.

[2] Zelah Pengilley. Scott-Brown's Otorhinolaryngology: Head and Neck Surgery 7th edition. Hodder Arnold.

[3] Agarwal S. Endoscopic dacryocystorhinostomy for acquired nasolacrimal duct obstruction. J Laryngol Otol. 2009 Nov;123(11):1226-8.

[4] Caldwell G.W. Two new operations for obstruction of the nasolacrimal duct. N. Y. Med. J. 1893 ; 57 : 281-2.

[5] Hirschberg J. The History of Ophtalmology. 1982. pp 10.

[6] Bakri SJ, Carney AS, Robinson K, et al. Quality of life outcomes following dacryocystorhinostomy: external and endonasal laser techniques compared. Orbit 1999; 18: 83-88.

[7] Ho A, Sachidananda R, Carrie S, et al. Quality of life assessment after non-laser endonasal dacryocystorhinostomy. Clin Otolaryngol. 2006; 31: 399-403.

[8] Spielmann PM, Hathorn I, Ahsan F, et al. The impact of endonasal dacryocystorhinostomy (DCR), on patient health status as assessed by the Glasgow benefit inventory. Rhinology 2009; 47: 48-50.

[9] Smirnov G, Tuomilehto H, Kokki H, Kemppainen T, Kiviniemi V, Nuutinen J, Kaarniranta K, Seppa J. Symptom score questionnaire for nasolacrimal duct obstruction in adults--a novel tool to assess the outcome after endoscopic

dacryocystorhinostomy. Rhinology. 2010 Dec;48(4):446-51. doi: 10.4193/ Rhin.

[10] Lund VJ, Mackay IS. Staging in rhinosinusitus. Rhinology 1993; 31: 183-184.

[11] Kamal S, Ali MJ, Nair AG . Outcomes of endoscopic dacryocystorhinostomy: Experience of a fellowship trainee at a tertiary care center. Indian J Ophthalmol. 2016 Sep;64(9):648-653. doi: 10.4103/0301-4738.194340

[12] Chester AC, Sindwani R. Symptom outcomes in endoscopic sinus surgery: a systematic review of measurement methods. Laryngoscope 2007; 117: 2239-2243

[13] Smirnov G, Tuomilehto H, Terasvirta M, et al. Silicone tubing is not necessary after primary endoscopic dacryocystorhinostomy: a prospective randomized study. Am J Rhinol. 2008; 22: 214-217.